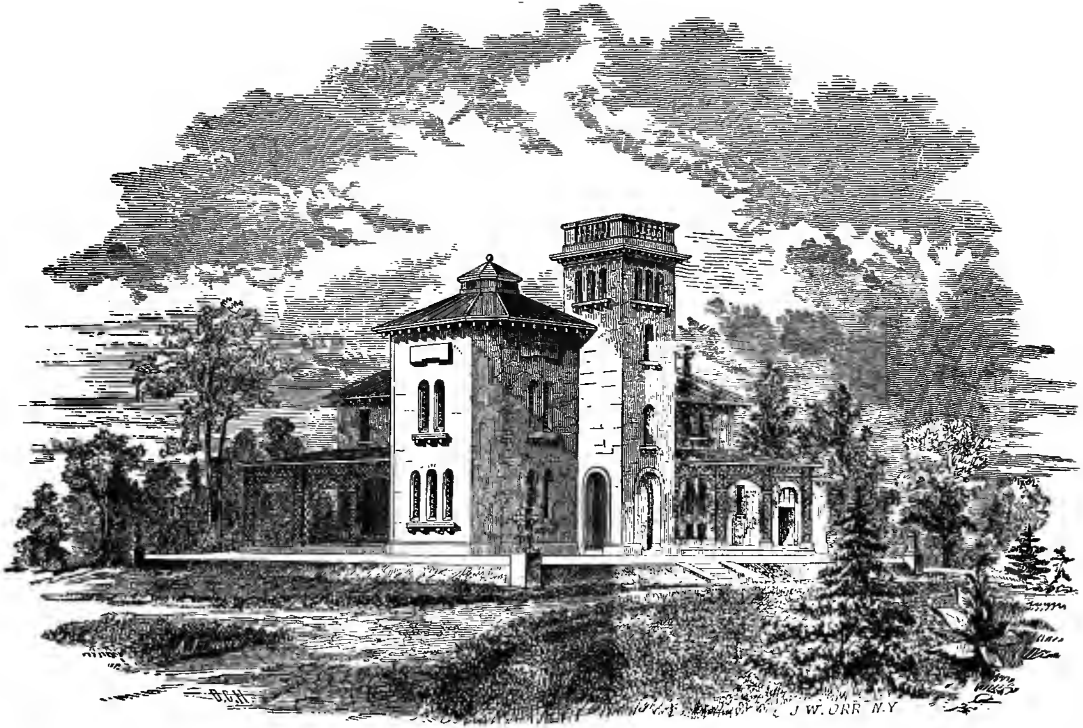

J.W. ORR N.Y

DOMESTIC AND RURAL AFFAIRS.

THE FAMILY

FARM AND GARDENS,

AND THE

DOMESTIC ANIMALS.

IN THREE PARTS. ILLUSTRATED.

Part I.—THE FAMILY:

HOW TO KEEP HOUSE, TO PROVIDE, TO COOK, TO WASH, TO BAKE, TO DYE, TO PAINT, TO PRESERVE HEALTH, TO CURE DISEASE, ETC.:

A MANUAL OF HOUSEHOLD MANAGEMENT.

Part II.—THE FARM AND GARDENS:

1. **The Farm.**—ITS MANAGEMENT AND PRODUCTS.
2. **The Kitchen-Garden.**—WHAT TO GROW, AND HOW TO GROW IT.
3. **The Fruit-Garden.**—HOW TO HAVE CHOICE FRUIT.
4. **The Flower-Garden.**—HOW TO GROW ALL OUT-DOOR FLOWERS.

Part III.—DOMESTIC ANIMALS:

1. **The Horse.**—TO BREED, BREAK, FEED, AND CURE.
2. **Cattle.**—THE BEST BREEDS, AND HOW TO MANAGE THEM.
3. **Sheep.**—THEIR BREEDS, MANAGEMENT, DISEASES, ETC.
4. **The Pig.**—TO BREED, FEED, CUT UP, AND CURE.
5. **Poultry.**—THE DIFFERENT KINDS, AND THEIR TREATMENT.
6. **Bees.**—THEIR HABITS, MANAGEMENT, ETC.

FROM THE LATEST AND BEST AUTHORITIES.

EDITED BY E. G. STORKE.

AUBURN, N. Y.
THE AUBURN PUBLISHING COMPANY.
E. G. STORKE, PUBLISHING AGENT.

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GENERAL PREFACE.

A glance at the title-page and index of this work will show the many important subjects embraced in it. Separate and complete treatises are given upon each. The department relating to The Family will be found to contain much new and valuable information, important to every housekeeper. The Farm, from its great importance, has received special attention, and contains, it is believed, much valuable instruction. The Kitchen, Fruit, and Flower Gardens have each received careful attention, and may be relied upon as containing instructions which are the results of long and thorough practical experience. Each of The Domestic Animals is separately considered, and all the necessary instructions given for their successful breeding, rearing, and management, in health and disease.

It has been the aim of the editor to be useful rather than original. No one man, however large his experience or thorough his observation, can be as safe a counselor or as wise a guide, upon the many subjects embraced in this work, as the collected wisdom of scores of minds, each long and thoroughly conversant with particular subjects. The editor, therefore, though not unfamiliar with the topics embraced in this work, has nevertheless chosen to use his experience and judgment in collecting the most useful and important information, from the most recent and reliable sources, and in arranging it in such form as should render it at once easy of comprehension and practice, and therefore useful to the masses.

He has long felt that a work embracing the features of this was much needed in most American families; and this view of its necessity and utility, he has the pleasure to say, has been concurred in by all to whom its plan has been submitted.

The aim has been to make the work plain and practical—to avoid mere speculation, and uninteresting and unprofitable details—to condense the most useful and important information possible within prescribed limits, and to adapt it to the wants of practical men.

It was intended to be a reliable and convenient reference book for the various duties appertaining to THE FAMILY, THE FARM, and THE GARDENS, and to the rearing and management of THE DOMESTIC ANIMALS—to aid the memories of the experienced and to instruct the young. With ample materials, and careful and persevering effort to accomplish his purpose, the editor can only say, that he hopes the reader will find the execution of the work as perfect as its plan.

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PART I.—THE FAMILY.

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AUTHORITIES CONSULTED.

The following, among other authorities, have been consulted in the preparation of this work, and to which we are more or less indebted for the valuable facts and instructions which it contains, viz.:

Southern Rural Almanac,
American Agriculturist,
Fruit Culturist,
Fruits and Fruit-Trees of America,
Fruit Garden,
Horticulturist,
Boussingault's Rural Economy,
Gardeners' Chronicle,
Breck's Book of Flowers,
Gardeners' Assistant,
Patent-Office Reports,
American Gardener,
Annual Register,
Rose Manual,
Book of the Farm,
Kitchen Gardener,
Flower-Garden Director,
American Fruit Book,
Landscape Gardening,
Albany Cultivator,
Southern Cultivator,
Muck Manual,
Fruit Grower's Guide,
Genesee Farmer,
Rural New-Yorker,
Valley Farmer,
Johnson's Agricultural Chemistry,
Liebig's Agricultural Chemistry,
Loudon's Gardening,
Loudon's, Mrs., Companion to the Flower-Garden,
Working Farmer,
Progressive Farmer,
Farmers' Every-Day Book,
Norton's Scientific Agriculture,
Gardening for The South,
Cotton-Planters' Manual,
Florists' Guide,
Gardeners' Instructor,
Dana's Prize Essay on Manures,
Richardson, Youatt, Dodd, Randall, Linsley, and Miles, on the Horse,
Youatt, Martin, Stevens, Guenon, Dodd, and Raynbird on Cattle,
Richardson, Youatt, Martin Doyle, and Sidney, on the Hog,
Youatt, Randall, Skinner, Martin &c., on Sheep,
Richardson, Delamar, Dixon, Kerr, and Miner, on Poultry,
Phelps, Miner, Weeks, Quimby, &c., on Bees,
Transactions N. Y. State Agricultural Society,
&c., &c., &c.

THE FAMILY

AND

HOUSEKEEPER'S GUIDE.

INDEX TO THE FAMILY GUIDE.

INTRODUCTION.

"Finding we consumed a vast deal of soap, I sat down in my thinking-chair and took the soap question into consideration, and found reason to suspect we were using a very expensive article where a much cheaper one would serve the purpose better. I ordered half a dozen pounds of both sorts, but took the precaution of changing the papers on which the prices were marked before giving them into the hands of Betty. 'Well, Betty, which soap do you find washes best?' 'Oh, please sir, the dearest, in the blue paper; it makes a lather as well again as the other.' 'Well, Betty, you shall always have it then;' and thus the unsuspecting Betty saved me some pounds a year, and washed the clothes better."—REV. SIDNEY SMITH.

ECONOMY with us is little understood, and less practiced. Since we have so far departed from the sterling and better habits of our ancestors as to leave the *execution* of our plans mostly to employees, it is certainly important to our own success, comfort, and happiness that we be able, at least, to lay good plans and to give intelligent and proper directions. The losses and discomforts which arise from our inability to do this are incalculable. In the various arts of practical household management how very deficient are many of the hundreds of thousands who, in this country, are annually assuming the positions of heads of families! And among those who long have held that position, how many mistakes are constantly committed, simply from ignorance of correct processes, or an unwillingness to investigate and understand the improvements which have been made in the arts of life. How much disappointment attends the practice of the simplest, yet most important of household arts. *Bread-making* is but imperfectly understood, and success is rather the exception than the rule; when, by a proper understanding of the true process, a failure to have light, sweet, and healthy bread would be a wonder. So with the various other departments of practical cookery. We too blindly follow the traditionary practices of the past, and give too little heed to the discoveries, improvements, and progress of the present. *Washing*, that most difficult and laborious of household arts, is now, by the assistance afforded by modern chemistry, performed with less than half the labor and in one-fourth of the time that were formerly bestowed upon it, and yet but few are aware of the fact; and the old patience-tiring, clothes and muscle wearing process is still generally in vogue among us. The saving that may be effected by substituting the use of *soda* for sugar, in correcting the acids in fruits, pies and puddings, is equally unknown; while the relative nutriment and healthfulness of the various alimentary substances are but imperfectly understood.

It is the design of this work to arrange in a form for convenient reference the latest and best discoveries and improvements relating to the practical details of household affairs in their various and complicated relations. The aim has been to exclude all unnecessary matter, and to condense the most important information within the shortest compass, so that any desired fact or direction could not only be quickly found, but when found could be easily understood and practiced. The latest and most reliable authorities have been consulted, and the work, it is believed, will be found accurate, and worthy the attention of every American family.

THE FAMILY.

THE FAMILY GUIDE.

DOMESTIC RULES.—1. Do every thing in its proper time. 2. Keep every thing to its proper use. 3. Put every thing in its proper place.

THE HOUSE claims primary attention. It is too often built more to gratify the public than its owner—to suit it to the wants of company rather than those who are to be its daily occupants; and the inconveniences resulting from such false notions are constant and severe. This folly, it is hoped, will soon cease. The house should be planned and constructed for a *home* for the family, and should combine, in the highest attainable degree, the requisites for their comfort and convenience. This should be the first object. At the same time, if the owner's means allow, a proper arrangement for the entertainment of friends should not be overlooked; for the cultivation of our social natures, and the exercise of hospitality, are important duties, which no discreet householder will overlook, as from them flow our choicest pleasures. It is not the sum invested in a dwelling, but the neatness, taste, and conveniences which it embodies, and its adaptation to the circumstances and wants of its owner that constitute its true harmony and beauty. The first point to be regarded in a house is its *position.* Carefully regard the healthfulness of the situation. Avoid the neighborhood of grave-yards, and of factories giving forth unhealthy vapors; avoid low and damp districts, the course of canals, and localities of reservoirs of water, gas-works, etc.; make inquiries as to the drainage of the neighborhood, and inspect the drainage and water supply of the premises. A house standing on an incline is likely to be better drained than one standing upon the summit of a hill, or on a level below a hill. Endeavor to obtain a position where the direct sunlight falls upon the house, for this is absolutely necessary to health, and give preference to a house the openings of which are sheltered from the north and east winds.

Consider the distance of the house from your place of occupation, and also its relation to provision markets, and the prices that prevail in the neighborhood.

Furnishing the House.—If you are about to furnish a house, do not spend all your money, be it much or little. Do not let the beauty of this thing, and the cheapness of that, tempt you to buy unnecessary articles. Doctor Franklin's maxim was a wise one—"Nothing is cheap that we do not want." Buy merely enough to get along with at first

It is only by experience that you can tell what will be the wants of your family. If you spend all your money, you will find you have purchased many things you do not want, and have no means left to get many things which you do want. If you have enough, and more than enough, to get every thing suitable to your situation, do not think you must spend it all, merely because you happen to have it. Begin humbly. As riches increase, it is easy and pleasant to increase in comforts; but it is always painful and inconvenient to decrease. After all, these things are viewed in their proper light by the truly judicious and respectable. Neatness, tastefulness, and good sense may be shown in the management of a small household, and the arrangement of a little furniture, as well as upon a larger scale; and these qualities are always praised, and always treated with respect and attention. The consideration which many purchase by living beyond their income, and, of course, living upon others, is not worth the trouble it costs. The glare there is about this false and wicked parade is deceptive; it does not, in fact, procure a man valuable friends or extensive influence.

Frugality.—The great philosopher, Dr. Franklin, inspired the mouth-piece of his own eloquence, "Poor Richard," with "many a gem of purest ray serene," encased in the homely garb of proverbial truisms. On the subject of frugality, we cannot do better than take the worthy Mentor for our text, and from it address our remarks. A man may, if he knows not how to save as he gets, "keep his nose all his life to the grindstone, and die not worth a groat at last. A fat kitchen makes a lean will," and

> "Many estates are spent in getting,
> Since women for tea forsook spinning and knitting,
> And men for punch forsook hewing and splitting."

If you would be wealthy, think of saving as well as of getting. The Indies have not made Spain rich, because her out-goes are greater than her in-comes.

Beware of little expenses. "A small leak will sink a great ship," as Poor Richard says; and again, "Who dainties love, shall beggars prove;" and moreover, "Fools make feasts, and wise men eat them."

Here you are all got together to this sale of fineries and nick-nacks. You call them goods; but if you do not take care, they will prove evils to some of you. You expect they will be sold cheap, and perhaps they may for less than they cost; but if you have no occasion for them, they must be dear to you.

Remember what Poor Richard says, "Buy what thou hast no need of, and ere long thou shalt sell thy necessaries."

And again, "At a great pennyworth, pause awhile." He means, perhaps, that the cheapness is apparent only, and not real; or the bargain, by straitening thee in thy business, may do thee more harm than good; for in another place he says, "Many have been ruined by buying good pennyworths."

Again, "It is foolish to lay out money in the purchase of repentance;" and yet this folly is practised every day at auctions, for want of minding the almanac.

Many, for the sake of finery on the back, have gone with a hungry stomach, and half-starved their families. "Silks and satins, scarlets and velvets, put out the kitchen fire," as Poor Richard says. These are not the necessaries of life; they can scarcely be called the conveniencies; and yet, only because they look pretty, how many want to have them?

By these and other extravagances, the genteel are reduced to poverty, and forced to borrow of those whom they formerly despised, but who through industry and frugality have maintained their standing; in which case it appears plainly that "A plowman on his legs is higher than a gentleman on his knees," as Poor Richard says. Perhaps they had a small estate left them, which they knew not the getting of; they think "it is day, and will never be night;" that a little to be spent out of so much is not worth minding; but "Always taking out of the meal-tub, and never putting in, soon comes to the bottom," as Poor Richard says; and then, "When the well is dry, they know the worth of water."

But this they might have known before, if they had taken his advice; "If you would know the value of money, go and try to borrow some; for he that goes a-borrowing goes a-sorrowing," as Poor Richard says; and, indeed, so does he that lends to such people, when he goes to get it in again. Poor Dick further advises:

> "Fond pride of dress is sure a very curse;
> Ere fancy you consult, consult your purse."

And again, "Pride is as loud a beggar as want, and a great deal more saucy."

When you have bought one fine thing, you must buy ten more, that your appearance may be all of a piece; but Poor Dick says, "It is easier to suppress the first desire than to satisfy all that follow it;" and it is as truly folly for the poor to ape the rich, as for the frog to swell in order to equal the ox.

> "Vessels large may venture more,
> But little boats should keep near shore."

It is, however, a folly soon punished; for "Pride that dines on vanity, sups on contempt; pride breakfasted with plenty, dined with poverty, and supped with infamy."

And, after all, of what use is this pride of appearance, for which so much is risked, so much is suffered? It cannot promote health, nor ease pain; it makes no increase of merit in the person; it creates envy. it hastens misfortune.

Generally speaking, we are very deficient in the practice of culinary economy. A French family would live well on what is often wasted in an American kitchen. The bones, drippings, pot-liquor, remains of fish, vegetables, etc., which are too often consigned to the grease-pot or the dust-heap, might, by a very trifling degree of management on the part of the cook, or mistress of a family, be converted into sources of daily support and comfort, at least to some poor pensioner or other, at an expense that even the miser could scarcely grudge.

HOW TO PROVIDE—Marketing.—The best rule for marketing is to pay ready money for every thing, and to deal with the most respectable tradesmen in your neighborhood. If you leave it to their integrity to supply you with a good article, at the fair market price, you will be supplied with better provisions, and at as reasonable a rate as those bargain-hunters who trot "around, around, around about" a market till they are trapped to buy some unchewable old poultry, tough tup-mutton, stringy cow-beef, or stale fish, at a very little less than the price of prime and proper food. With *savings* like these they toddle home in triumph, cackling all the way, like a goose that has got ancle-deep into good luck. All the skill of the most accomplished cook will avail nothing unless she is furnished with prime provisions. The best way to procure these is to deal with shops of established character. You may appear to pay, perhaps, ten per cent. more than you would were you to deal with those who pretend to sell cheap, but you would be much more than in that proportion better served. Every trade has its tricks and deceptions; those who follow them can deceive you if they please, and they are too apt to do so, if you provoke the exercise of their overreaching talent. Challenge them to a game at "catch who can," by entirely relying on your own judgment, and you will soon find nothing but very long experience can make you equal to the combat of marketing to the utmost advantage. If you think a tradesman has imposed upon you, never use a second word, if the first will not do, nor drop the least hint of an imposition. The only method to induce him to make an abatement is the hope of future favors, pay the demand, and deal with the gentleman no more; but do not let him see that you are displeased, or as soon as you are out of sight your reputation will suffer as much as your pocket has. Before you go to market, look over your larder, and consider well what things are wanting—especially on a Saturday. No well-regulated family can suffer a disorderly caterer to be jumping in and out to make purchases on a Sunday morning. You will be enabled to manage much better if you will make out a bill of fare for the week on the Saturday before—for example, for a family of half a dozen:

Sunday—Roast-beef and pudding.
Monday—Fowl, with what was left of pudding, fried, or warmed in the Dutch oven.
Tuesday—Calf's head, apple-pie.
Wednesday—Leg of mutton.
Thursday—Do. broiled or hashed, or cakes.
Friday—Fish, pudding.
Saturday—Fish, or eggs and bacon.

Choice of Articles of Food.—Nothing is more important in the affairs of housekeeping than the choice of wholesome food. We have been amused by a conundrum, which is as follows: "A man went to market and bought *two* fish. When he reached home he found they were the same as when he had bought them, yet there were *three!*" How was this? The answer is—"He bought two mackerel, and one *smelt!*" Those who envy him his bargain need not care about the following rules; but to others they will be valuable:

Mackerel must be perfectly fresh, or it is a very indifferent fish; it will neither bear carriage nor being kept many hours out of the water. The firmness of the flesh and the clearness of the eyes must be the criterion of fresh mackerel, as they are of all other fish.

Flounders, and all flat white fish, are rigid and firm when fresh; the under side should be of a rich cream color. When out of season, or too long kept, this becomes a bluish white, and the flesh soft and flaccid A clear, bright eye in fish is also a mark of being fresh and good.

Cod is known to be fresh by the rigidity of the muscles (or flesh), the redness of the gills, and clearness of the eyes. Crimping much improves this fish.

Salmon. The flavor and excellence of this fish depends upon its freshness, and the shortness of time since it was caught; for no method can completely preserve the delicate flavor it has when just taken out of the water.

Herrings can only be eaten when very fresh, and, like mackerel, will not remain good many hours after they are caught.

Fresh-water fish. The remarks as to firmness and clear, fresh eyes apply to this variety of fish, of which there are pike, perch, etc.

Lobsters recently caught have always some remains of muscular action in the claws, which may be excited by pressing the eyes with the finger. When this cannot be produced, the lobster must have been too long kept. When boiled, the tail preserves its elasticity if fresh, but loses it as soon as it becomes stale. The heaviest lobsters are the best; when light, they are watery and poor. Hen lobsters may generally be known by the spawn, or by the breadth of the "flap."

Crabs must be chosen by observations similar to those given above in the choice of lobsters. Crabs have an agreeable smell when fresh.

Prawns and *shrimps*, when fresh, are firm and crisp.

Oysters. If fresh, the shell is firmly closed; when the shells of oysters are opened, they are dead, and unfit for food. The small-shelled oysters are the finest in flavor. Larger kinds, called rock oysters, are generally considered only fit for stewing and sauces, though some persons prefer them.

Beef. The grain of ox beef, when good, is loose, the meat red, and the fat inclining to yellow. Cow beef, on the contrary, has a closer grain, a whiter fat, but meat scarcely as red as that of ox beef. Inferior beef, which is meat obtained from ill-fed animals, or from those which had become too old for food, may be known by a hard skinny fat, a dark red lean, and, in old animals, a line of horny texture running through the meat of the ribs. When meat pressed by the finger rises up quickly, it may be considered as that of an animal which was in its prime; when the dent made by pressure returns slowly, or remains visible, the animal had probably past its prime, and the meat consequently must be of inferior quality.

Veal should be delicately white, though it is often juicy and well flavored when rather dark in color. Butchers, it is said, bleed calves purposely before killing them, with a view to make the flesh white, but this also makes it dry and flavorless. On examining the loin, if the fat enveloping the kidney be white and firm-looking, the meat will probably be prime and recently killed. Veal will not keep so long as an older meat, especially in hot or damp weather; when going, the fat becomes soft and moist, the meat flabby and spotted, and somewhat porous, like sponge. Large, overgrown veal is inferior to small, delicate, yet fat veal. The fillet of a cow-calf is known by the udder attached to it, and by the softness of the skin; it is preferable to the veal of a bull-calf.

Mutton. The meat should be firm and close in grain, and red in color, the fat white and firm. Mutton is in its prime when the sheep is about five years old, though it is often killed much younger. If too young, the flesh feels tender when pinched; if too old, on being pinched it wrinkles up, and so remains. In young mutton, the fat readily separates; in old, it is held together by strings of skin. In sheep diseased of the rot, the flesh is very pale-colored, the fat inclining to yellow; the meat appears loose from the bone, and, if squeezed, drops of water ooze out from the grains; after cooking, the meat drops clean away from the bones. Wether mutton is preferred to that of the ewe; it may be known by the lump of fat on the inside of the thigh.

Lamb. This meat will not keep long after it is killed. The large vein in the neck is bluish in color when the fore-quarter is fresh, green when becoming stale. In the hind-quarter, if not recently killed, the fat of the kidney will have a slight smell, and the knuckle will have lost its firmness.

Pork. When good, the rind is thin, smooth, and cool to the touch; when changing, from being too long killed, it becomes flaccid and clammy. Enlarged glands, called kernels, in the fat, are marks of an ill-fed or diseased pig.

Bacon should have a thin rind, and the fat should be firm and tinged red by the curing; the flesh should be of a clear red, without intermixture of yellow, and it should firmly adhere to the bone. To judge the state of a ham, plunge a knife into it to the bone; on drawing it back, if particles of meat adhere to it, or if the smell is disagreeable, the curing has not been effectual, and the ham is not good; it should, in such a state, be immediately cooked. In buying a ham, a short, thick one is to be preferred to one long and thin.

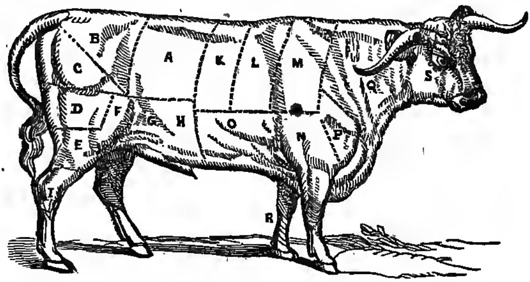
Venison. When good, the fat is clear, bright, and of considerable thickness. To know when it is necessary to cook it, a knife must be plunged into the haunch, and from the smell the cook must determine on dressing or keeping it.

Choice of Vegetables.—As to the quality of vegetables the middle size are preferred to the largest or the smallest; they are more tender, juicy, and full of flavor, just before they are quite full grown: freshness is their chief value and excellence, and I should as soon think of roasting an animal alive as of boiling a vegetable after it is dead. The eye easily discovers if they have been kept too long; they soon lose their beauty in all respects.

Roots, greens, salads, etc., and the various productions of the garden, when first gathered, are plump and firm, and have a fragrant freshness no art can give them again; though it will refresh them a little to put them into cold spring water for some time before they are dressed.

To Preserve Potatoes.—The preservation of potatoes by dipping them in boiling water is a valuable and useful discovery. Large quantities may be cured at once, by putting them into a basket as large as the vessel containing the boiling water will admit, and then just dipping them a minute or two at the utmost. The germ, which is so near the skin, is thus destroyed without injury to the potato. In this way several tons might be cured in a few hours. They should be then dried in a warm oven, and laid up in sacks, secure from the frost, in a dry place.

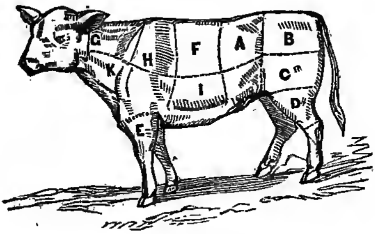
Choice of Meats—*Names and Situation of the Joints.*



A BULLOCK MARKED AS CUT BY THE BUTCHER.

A Sirloin.
B Rump.
C Aitchbone.
D Buttock.
E Mouse Buttock.
F Veiny piece.
G Thick Flank.
H Thin Flank.
I Leg.
K Fore Ribs, containing five ribs.
L Middle Rib, containing four ribs.
M Chuck Rib, containing three ribs.
N Shoulder, or Leg of Mutton piece
O Brisket.
P Clod.
Q Neck, or Sticking piece.
R Shin.
S Cheek.

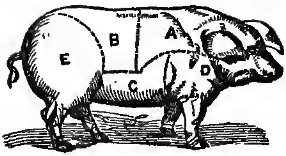
The baron of beef is formed of the pieces marked A, B, united on both sides.



VEAL.

A The Loin (best end.)
B The Loin (chump end.)
C The Fillet.
D The Hind Knuckle.
E The Fore Knuckle.
F Neck (best end.)
G Neck (scrag.)
H Blade-Bone.
I Breast (best end.)
K Breast (brisket.)

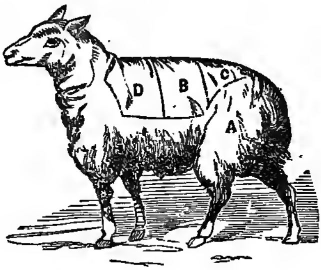
The calf is divided into joints by the butcher, upon a system which unites the methods employed for cutting up both beef and mutton.



PORK.

A The Fore Loin.
B The Hind Loin.
C The Belly, or Spring.
D The Hand.
E The Leg.

The sparerib is under the shoulder, which, when removed in a porker, leaves part of the neck without a skin upon it, forming the sparerib. The head is much liked by many, and appears at table dressed in various ways.



The sheep is thus apportioned by butchers:

A The Leg.
B Loin (the best end.)
C Loin (Chump end.)
D Neck (best end.)
E Neck (scrag end.)
F Shoulder.
G Breast.

Relative Economy of the Joints.—The round is, in large families, one of the most profitable parts. It is usually boiled, and, like most of the boiling parts of beef, is generally sold less than roasting joints.

The brisket is also a penny a pound less in price than the roasting parts. It is not so economical a part as the round, having more bone to be weighed with it, and more fat. Where there are children, very fat joints are not desirable, being often disagreeable to them, and sometimes prejudicial, especially if they have a dislike to it. This joint also requires more cooking than many others; that is to say, it requires a double allowance of time to be given for boiling it; it will, when served, be hard and scarcely digestible if no more time be allowed to boil it than that which is sufficient for other joints and meats. When stewed it is excellent; and when cooked fresh (*i. e.* unsalted), an excellent stock for soup may be extracted from it, and yet the meat will serve as well for dinner.

The edgebone, or aitchbone, is not considered to be a very economical joint, the bone being large in proportion to the meat; but the greater part of it at least is as good as that of any prime part. It sells at a penny a pound less than roasting joints.

The rump is the part of which the butcher makes great profit, by selling it in the form of steaks. In the country, as there is not an equal demand for steaks, the whole of it may be purchased as a joint, and at the price of other prime parts. It may be turned to good account in producing many excellent dishes. If salted, it is simply boiled; if used unsalted, it is usually stewed.

The veiny piece is sold at a low price per pound; but if hung for a day or two it is very good and very profitable. Where there are a numper of servants and children to have an early dinner, this part of beef will be found desirable.

From the leg and shin excellent stock for soup may be drawn; and if not reduced too much, the meat taken from the bones may be served as a stew with vegetables; or it may be seasoned pounded with butter, and potted; or chopped very fine, and seasoned with herbs, and bound together by egg and bread-crumbs; it may be fried in balls, or in the form of large eggs, and served with a gravy made with a few spoonfuls of the soup.

Of half an ox-cheek excellent soup may be made; the meat, wheu taken from the bones, may be served as a stew.

Roasting parts of beef are the sirloin and the ribs, and these bear in all places the highest price. The most profitable of these two joints at a family table is the ribs. The bones, if removed from the beef before it is roasted, will assist in forming the basis of a soup. When boned, the meat of the ribs is often rolled up, tied with strings, and roasted; and this is the best way of using it, as it enables the carver to distribute equally the upper part of the meat with the more skinny and fatter parts at the lower end of the bones.

To Preserve Fresh Meats.—Meat may be kept several days in the height of summer, sweet and good, by lightly covering it with bran and hanging it in some high or windy room, or in a passage where there is a current of air.

MODES OF COOKING.

The different modes of cooking, as boiling, baking, frying, and broiling will now be considered.

BOILING.—This most simple of all culinary processes is not often performed in perfection. It does not require quite so much care and attention as roasting; to keep your pot really boiling, and to skim it to know how long is required for cooking the joint, etc., and to take it up at the right time, though apparently a simple process, yet to do it in the best manner requires more care than is generally believed. When the pot is coming to a boil there will always, from the cleanest meat and clearest water, rise a scum to the top of it, proceeding partly from the foulness of the meat, and partly from the water; this must be carefully taken off as soon as it rises. On this depends the good appearance of all boiled things, an essential matter. When you have scummed well, put in some cold water, which will throw up the rest of the scum. The oftener it is scummed, and the cleaner the top of the water is kept, the cleaner will be the meat. If let alone it soon boils down and sticks to the meat, which, instead of looking delicately white and nice, will have that coarse and filthy appearance we have too often to complain of, and the butcher and poulterer be blamed for the carelessness of the cook in not scumming her pot with due diligence. Many put in milk, to make what they boil look white, but this does more harm than good; others wrap it up in a cloth, but these are needless precautions; if the scum be attentively removed, meat will have a much more delicate color and finer flavor than it has when muffled up. This may give rather more trouble, but those who wish to excel in their art must only consider how the processes of it can be most perfectly performed: a cook who has a proper pride and pleasure in her business will make this her maxim and rule on all occasions. Put your meat into cold water, in the proportion of about a quart of water to a pound of meat; it should be covered with water during the whole of the process of boiling, but not drowned in it; the less water, provided the meat be covered with it, the more savory will be the meat, and the better will be the broth in every respect. The water should be heated gradually, according to the thickness, etc., of the article boiled; for instance, a leg of mutton of ten pounds' weight should be placed over a moderate fire, which will gradually make the water hot, without causing it to boil, for about forty minutes; if the water boils much sooner, the meat will be hardened and shrink up as if it had been scorched; by keeping the water a certain time heating without boiling its fibers are dilated, and it yields a quantity of scum, which must be taken off as soon as it rises, for the reasons already mentioned. "If a vessel containing water be placed over a steady fire, the water will grow continually hotter till it reaches the limit of boiling, after which, the regular accessions of heat are wholly spent in converting it into steam; the water remains at the same pitch of temperature however fiercely it boils. The only difference is, that with a strong fire it sooner comes to boil, and more quickly boils away and is converted into steam."

Time for Boiling and Roasting.—Ten pounds of beef require from two hours to two hours and a half roasting, eighteen inches from a good clear fire.

Six pounds require one hour and a quarter to one hour and a half, fourteen inches from a good clear fire.

Three ribs of beef, boned and rolled, tied round with paper, will require two hours and a half, eighteen inches from the fire; baste once only.

The first three ribs, of fifteen or twenty pounds, will take three hours or three and a half.

Reckon the time for its first coming to boil. The old rule of fifteen minutes to a pound of meat we think rather too little; the slower it boils the tenderer, the plumper, and whiter it will be. For those who choose their food thoroughly cooked (which all will who have any regard for their stomachs), twenty minutes to a pound will not be found too much for gentle simmering by the side of the fire, allowing more or less time according to the thickness of the joint and the coldness of the weather, always remembering, the slower it boils the better. Without some practice it is difficult to teach any art; and cooks seem to suppose they must be right if they put meat into a pot and set it over the fire for a certain time, making no allowance whether it simmers without a bubble or boils at a gallop.

Fresh killed meat will take much longer time boiling than that which has been kept till it is what the butchers call ripe, and longer in cold than in warm weather; if it be frozen, it must be thawed before boiling as before roasting; if it be fresh killed, it will be tough and hard if you stew it ever so long and ever so gently. In cold weather, the night before you dress it bring it into a place of which the temperature is not less than forty-five degrees of Fahrenheit's thermometer. The size of the boiling-pots should be adapted to what they are to contain—the larger the saucepan the more room it takes upon the fire, and a larger quantity of water requires a proportionate increase of fire to boil it. In small families we recommend block-tin saucepans etc., as lightest and safest; if proper care is taken of them, and they are well dried after they are cleansed, they are by far the cheapest—the purchase of a new tin saucepan being little more than the expense of tinning a copper one. Take care that the covers of your boiling-pots fit close, not only to prevent unnecessary evaporation of the water, but that the smoke may not insinuate itself under the edge of the lid and give the meat a bad taste.

If you let meat or poultry remain in the water after it is done enough it will become sodden and lose its flavor.

Beef and mutton a little underdone (especially very large joints, which will make the better hash or broil) is not a great fault—by some people it is preferred; but lamb, pork, and veal are uneatable if not thoroughly boiled—but do not overdo them. A trivet, or fish-drainer, put on the bottom of the boiling-pot, raising the contents about an inch and a half from the bottom, will prevent that side of the meat which comes next the bottom from being done too much, and the lower part of the meat will be as delicately done as the other part; and this will enable you to take out the contents of the pot without sticking a fork, etc., into it. If you have not a trivet, use four skewers, or a soup-plate laid the wrong side upward.

Take care of the liquor you have boiled poultry or meat in; in five minutes you may make it into soup.

The good housewife never boils a joint without converting the broth into some sort of soup.

If the liquor be too salt, only use half the quantity, and the rest water; wash salted meat well with cold water before you put it into the boiler.

ROASTING—Time required.—The noble sirloin of about fifteen pounds (if much thicker the outside will be done too much before the inside is enough), will require to be before the fire about three and a half or four hours. Take care to spit it evenly, that it may not be heavier on one side than the other; put a little clean dripping into the dripping-pan (tie a sheet of paper over it to preserve the fat); baste it well, as soon as it is put down, and every quarter of an hour all the time it is roasting till the last half hour; then take off the paper and make some gravy for it, stir the fire and make it clear; to brown and froth it, sprinkle a little salt over it, baste it with butter, and dredge it with flour; let it go a few minutes longer till the froth rises, take it up, put it on the dish, etc. Garnish it with horse-radish scraped as fine as possible with a very sharp knife.

A Yorkshire pudding is an excellent accompaniment.

Ribs of Beef.—The three first ribs, of fifteen or twenty pounds, will take three hours or three and a half; the fourth and fifth ribs will take as long, managed in the same way as the sirloin. Paper the fat and the thin part, or it will be done too much before the thick part is done enough.

Ribs of Beef Boned and Rolled.—When you have kept two or three ribs of beef till quite tender, take out the bones, and skewer it as round as possible (like a fillet of veal); before they roll it, some cooks egg it and sprinkle it with veal stuffing. As the meat is more in a solid mass, it will require more time at the fire than in the preceding receipt; a piece of ten or twelve pounds' weight will not be well and thoroughly roasted in less than four and a half or five hours. For the first half hour it should not be less than twelve inches from the fire, that it may get gradually warm to the center; the last half hour before it will be finished sprinkle a little salt over it, and if you wish to froth it, flour it, etc.

Mutton.—As beef requires a large sound fire, mutton must have a brisk and sharp one; if you wish to have mutton tender it should be hung as long as it will keep, and then good eight-tooth, *i. e.*, four years' old mutton, is as good eating as venison.

The Leg, Haunch, and Saddle will be the better for being hung up in a cool airy place for four or five days at least; in temperate weather, a week; in cold weather, ten days. A leg of eight pounds will take about two hours; let it be well basted.

A Chine or Saddle, *i. e.*, the two loins, of ten or eleven pounds, two hours and a half. It is the business of the butcher to take off the skin and skewer it on again, to defend the meat from extreme heat, and preserve its succulence. If this is neglected, tie a sheet of paper over it; baste the strings you tie it on with directly or they will burn. About a quarter of an hour before you think it will be done take off the skin or paper, that it may get a pale-brown color, and then baste it and flour it lightly to froth it.

A Shoulder, of seven pounds, an hour and a half. Put the spit in close to the shank-bone, and run it along the blade-bone.

A Loin of Mutton, from an hour and a half to an hour and three quarters. The most elegant way of carving this is to cut it lengthwise, as you do a saddle. A neck, about the same time as a loin. It must be carefully jointed or it is very difficult to carve.

The Neck and Breast are, in small families, commonly roasted together. The cook will then crack the bones across the middle before they are put down to roast. If this is not done carefully they are very troublesome to carve. A breast, an hour and a quarter.

A Haunch, *i. e.*, the leg and part of the loin of mutton. Send up two sauce-boats with it, one of rich-drawn mutton gravy, made without spice or herbs, and the other of sweet-sauce. It generally weighs about fifteen pounds, and requires about three hours and a half to roast it.

Mutton (venison fashion).—Take a neck of good four or five year old wether mutton, cut long in the bones; let it hang, in temperate weather, t least a week. Two days before you dress it, take allspice and black pepper, ground and pounded fine, a quarter of an ounce each, rub them together, and then rub your mutton well with this mixture twice a day. When you dress it, wash off the spice with warm water, and roast it in paste.

A Fillet of Veal, of from twelve to sixteen pounds, will require from four to five hours at a good fire; make some stuffing or forcemeat and put it under the flap, that there may be some left to eat cold, or to season a hash; brown it, and pour good melted butter over it. Garnish with thin slices of lemon, and cakes or balls of stuffing, or duck-stuffing, or fried pork sausages, curry sauce, bacon and greens, etc.

A Loin is the best part of the calf, and will take about three hours roasting. Paper the kidney fat and the back; some cooks send it up on a toast, which is eaten with the kidney and the fat of this part, which is more delicate than any marrow, etc. If there is more of it than you think will be eaten with the veal, before you roast it cut it out, it will make an excellent suet pudding; take care to have your fire long enough to brown the ends.

A Shoulder of Veal, from three hours to three hours and a half; stuff it with the forcemeat ordered for the fillet of veal in the under side.

Neck, best end, will take two hours. The scrag part is best made into a pie or broth. Breast, from an hour and a half to two hours. Let the caul remain till it is almost done, then take it off to brown it; baste, flour, and froth it.

Veal Sweet-bread.—Trim a fine sweet-bread, it cannot be too fresh; parboil it for five minutes, and throw it into a basin of cold water; roast it plain, or beat up the yolk of an egg, and prepare some fine bread-crumbs. When the sweet-bread is cold, dry it thoroughly in a cloth, run a lark-spit or a skewer through it, and tie it on the ordinary spit; egg it with a paste brush, powder it well with bread-crumbs, and roast it. For sauce, fried bread-crumbs round it, and melted butter with a little mushroom catsup and lemon-juice, or serve them on buttered toast, garnished with egg sauce or with gravy.

Lamb is a delicate and commonly considered tender meat; but those who talk of tender lamb, while they are thinking of the age of the animal forget that even a chicken must be kept a proper time after it has been killed, or it will be tough picking Woeful experience has warned us to beware of accepting an invitation to dinner on Easter Sunday; and, unless commanded by a thorough-bred gourmand, our incisors, molars, and principal viscera have protested against the imprudence of encountering young tough, stringy mutton under the misnomer of grass-lamb. To the usual accompaniments of roasted meat, green mint sauce or a salad is commonly added; and some cooks, about five minutes before it is done, sprinkle it with a little minced parsley.

Leg of five pounds, from an hour to an hour and a half.

Shoulder, with a quick fire, an hour.

Ribs, about an hour to an hour and a quarter; joint it nicely; crack the ribs across, and bend them up to make it easy to carve.

Loin, an hour and a quarter. Neck, an hour. Breast, three-quarters of an hour.

COOKING MEATS.

GENERAL PRINCIPLES.—"In the hands of an expert cook," says Majendie, "alimentary substances are made almost entirely to change their nature, their form, consistence, odor, savor, color, chemical composition, etc.; every thing is so modified, that it is often impossible for the most exquisite sense of taste to recognize the substance which makes up the basis of certain dishes. The greatest utility of the kitchen consists in making the food agreeable to the senses, and rendering it easy of digestion."

Boiling extracts a portion of the juice of meat, which mixes with the water, and also dissolves some of its solids; the more fusible parts of the fat melt out, combine with the water, and form soup or broth. The meat loses its red color, becomes more savory in taste and smell, and more firm and digestible. If the process is continued *too long*, the meat becomes indigestible, less succulent, and tough.

To boil meat to perfection, it should be done slowly, in plenty of water, replaced by other hot water as evaporation takes place; for, if boiled too quickly, the outside becomes tough; and not allowing the ready transmission of heat, the interior remains rare.

The loss by boiling varies, according to Professor Donovan, from 6¼ to 16 per cent. The average loss on boiling butchers' meat, pork, hams, and bacon, is 12; and on domestic poultry, is 14¾.

The loss per cent. on boiling salt beef is 15; on legs of mutton, 10; hams, 12½; salt pork, 13⅓; knuckles of veal, 8⅓; bacon, 6¼; turkeys, 16; chickens, 13½.

The established rule as regards time, is to allow a quarter of an hour for each pound of meat if the boiling is rapid, and twenty minutes if slow. There are exceptions to this; for instance, ham and pork, which require from twenty to twenty-five minutes per pound, and bacon nearly half an hour. For solid joints allow fifteen minutes for every pound, and from ten to twenty minutes over; though, of course, the length of time will depend much on the strength of the fire, regularity in the boiling, and size of the joint. The following table will be useful as an average of the time required to boil the various articles:

	H.	M.
A ham, 20 lbs. weight, requires	6	30
A tongue (if dry), after soaking	4	0
A tongue, out of pickle	2½ to 3	0
A neck of mutton	1	30
A chicken	0	20
A large fowl	0	45
A capon	0	35
A pigeon	0	15

Roasting, by causing the contraction of the cellular substance which contains the fat, expels more fat than boiling. The free escape of watery particles in the form of vapor, so necessary to produce flavor, must be regulated by frequent basting with the fat which has exuded from the meat, combined with a little salt and water—otherwise the meat would burn, and become hard and tasteless. A brisk fire at first ill, by charring the outside, prevent the heat from penetrating, and therefore should only be employed when the meat is half roasted.

The loss by roasting varies, according to Professor Donovan, from 14 3-5ths to nearly double that rate, per cent. The average loss on roasting butchers' meat is 22 per cent.; and on domestic poultry is 20½.

The loss per cent. on roasting beef, viz., on sirloins and ribs together, is 19 1-6th; on mutton, viz., legs and shoulders together, 24 4-5ths; on fore-quarters of lamb, 22⅓; on ducks, 27 1-5th; on turkeys, 20½; on geese, 19½; on chickens, 14 3-5ths. So that it will be seen by comparison with the percentage given of the loss by boiling, that roasting is not so economical; especially when we take into account that the loss of weight by boiling is not actual loss of economic materials, for we then possess the principal ingredients for soups; whereas, after roasting, the fat only remains. The average loss in boiling and roasting together is 18 per cent. according to Donovan, and 28 per cent. according to Wallace—a difference that may be accounted for by supposing a difference in the fatness of the meat, duration and degree of heat, &c., employed.

The time required to roast various articles of food with a clear good fire is given below:

	H.	M.
A small capon, fowl, or chicken, requires	0	20
A large fowl	0	45
A capon, full size	0	35
A goose	1	0
Wild ducks, and grouse	0	15
Pheasants, and turkey poults	0	20
A moderate-sized turkey, stuffed	1	15
Partridges	0	25
Quail	0	10
A hare or rabbit ... about	1	0
Beef, ten pounds	2	30
Leg of pork, ¼ hour for each pound, and above that allowance	0	20
A chine of pork	2	0
A neck of mutton	1	30
A haunch of venison ... about	3	30

To roast properly, meat should be put a good distance from the fire, and brought gradually nearer when about half the time required for cooking it has elapsed; it should be basted frequently; and when nearly done, floured to make it look frothed. Old meats do not require so much dressing as young; and, if not fat enough, use a little dripping for basting. Veal and mutton require a little paper put over the fat, to preserve it from being burnt.

If roasting with a spit, be careful to have it well cleaned before running it through the meat, which should be done always in the inferior parts; but in many joints the spit will pass into the bones, and run along them for some distance, so as not to stain or injure the prime part. Balance skewers will frequently be required.

Broiling requires a brisk rapid heat, which, by producing a greater degree of change in the affinities of the raw meat than roasting, generates a higher flavor, so that broiled meat is more savory than roast. The surface becoming charred, a dark-colored crust is formed, which retards the evaporation of the juices; and, therefore, if properly done, broiled may be as tender and juicy as roasted meat.

Baking does not admit of the evaporation of the vapors so rapidly as by the processes of broiling and roasting; the fat is also retained more, and becomes converted by the agency of the heat into an empyreumatic oil, so as to render the meat less fitted for delicate stomachs, and more difficult to digest. The meat is, in fact, partly boiled in its own confined water, and partly roasted by the dry hot air of the oven.

The loss by baking has not been estimated; and, as the time required to cook many articles must vary with their size, nature, &c., we have considered it better to leave that until giving the receipts for them.

Frying is of all methods the most objectionable, from the foods being less digestible when thus prepared, as the fat employed undergoes chemical changes. Olive oil in this respect is preferable to lard or butter. The crackling noise which accompanies the process of frying meat in a pan is occasioned by the explosions of steam formed in fat, the temperature of which is much above two hundred and twelve degrees. If the meat is very juicy it will not fry well, because it becomes sodden before the water is evaporated; and it will not brown because the temperature is too low to scorch it. To fry fish well, the fat should be boiling hot (six hundred degrees,) and the fish *well dried* in a cloth; otherwise, owing to the generation of steam, the temperature will fall so low that it will be boiled in its own steam, and not be browned. Meat, or, indeed, any article, should be frequently turned and agitated during frying, to promote the evaporation of the watery particles.

We append Dr. Kitchener's directions for baking meats:

"*Baking* is one of the cheapest and most convenient ways of dressing a dinner in small families; and, I may say, that the oven is often *the only kitchen a poor man has*, if he wishes to enjoy a joint of meat at home with his family.

"I don't mean to deny the superior excellence of roasting to baking; but some joints, when baked, so nearly approach to the same when roasted, that I have known them to be carried to the table, and eaten as such with great satisfaction.

"Legs and Loins of Pork, Legs of Mutton, Fillets of Veal, and many other joints, will bake to great advantage, if the meat be good; I mean well-fed rather inclined to be fat; if the meat be poor, no baker can give satisfaction.

"When baking a joint of meat, before it has been half baked, I have seen it start from the bone, and shrivel up in a manner scarcely to be believed.

"Besides those joints above mentioned, I shall enumerate a few baked dishes which I can particularly recommend:

"A Pig, when sent to the baker prepared for baking, should have its ears and tail covered with buttered paper properly fastened on, and a bit of butter tied up in a piece of linen to baste the back with, otherwise it will be apt to blister: with a proper share of attention from the baker, I consider this way equal to a roasted one.

"A GOOSE prepare the same as for roasting, taking care to have it on a stand, and when half done to turn the other side upwards. A DUCK the same.

"A BUTTOCK OF BEEF; the following way is particularly fine: after it has been in salt about a week, to be well washed, and put into a brown earthen pan, with a pint of water; cover the pan tight over with two or three thicknesses of *cap* or *foolscap* paper—never cover any thing that is to be baked with *brown* paper; the pitch and tar which are in brown paper will give the meat a smoky, bad taste—give it four or five hours in a moderately-heated oven.

"A HAM (if not too old) put in soak for an hour, taken out and wiped, a crust made sufficient to cover it all over, and baked in a moderately-heated oven, cuts fuller of gravy, and of a finer flavor than a boiled one.

"I have been in the habit of baking small CODFISH and MACKEREL with a dust of flour and some bits of butter put on them. EELS, when large, are stuffed. HERRINGS are done in a brown pan, with vinegar and a little spice, and tied over with paper.

"A RABBIT prepare the same as for roasting, with a few pieces of butter and a little drop of milk put into the dish, and basted several times, will be found nearly equal to roasting; or cut it up, season it properly, put it into a jar or pan, and cover it over, and bake it in a moderate oven for about three hours.

"In the same manner I have been in the habit of baking LEGS and SHINS of BEEF, OX-CHEEKS, etc., prepared with a seasoning of onions, turnips, etc.; they will take about four hours; let them stand till cold, to skim off the fat; then warm it up all together, or in part, as you may want.

"All these I have been in the habit of baking for the first families.

"The time each of the above articles should take depends much upon the state of the oven, and I consider the baker a sufficient judge; if they are sent to him in time, he must be very neglectful if they are not ready at the time they are ordered."

Beef, Cold, Boiled.—The same as roast-beef bones. The meat should have been underdone in the first instance. Capital relish with the accessories.

Beef (Rump) Steak and Onion Sauce.—Peel and slice two large onions, put them into a quart stew-pan, with two tablespoonfuls of water; cover the pan close, and set on a slow fire till the water has boiled away, and the onions have got a little browned; then add half a pint of good broth, and boil the onions till they are tender; strain the broth from them, and chop them very fine, and season it with mushroom catsup, pepper, and salt; put the onion into it, and let it boil gently for five minutes, pour it into the dish, and lay over it a broiled rump-steak. If instead of broth you use good beef gravy, it will be superlative.

Round of Salt Beef.—Skewer it tight and round, and tie a fillet of broad tape round it. Put it into plenty of cold water, and carefully skim the scum; let it boil till all the scum is removed, and then put the boiler on one side of the fire, to keep simmering slowly till it is done. Half a round may be boiled for a small family.

UTENSILS FOR COOKING.—The Gridiron, though the simplest of cooking instruments, is by no means to be despised. The gridiron, as indeed all cooking utensils, should be kept scrupulously clean; and when it is used, the bars should be allowed to get warm before the meat is placed upon it, otherwise the parts crossed by the bars will be insufficiently dressed. The fire should be sharp, clear, and free from smoke. The heat soon forms a film upon the surface of the meat, by which the juices are retained. Chops and steaks should not be too thick nor too thin. From a half to three-quarters of an inch is the proper thickness. Avoid thrusting the fork into the meat, by which you release the juice. There is a description of gridiron in which the bars are grooved to catch the juice of the meat; but a much better invention is the upright gridiron, which is attached to the front of the grate, and has a pan at the bottom to catch the gravy. Kidneys, rashers, etc., dressed in this manner will be found delicious. There are some, however, who think that the dressing of meat *over* the fire secures a flavor which cannot otherwise be obtained. Remember that the gridiron is devoted to the cooking of small dishes, or snacks for breakfast, supper, and luncheon, and is therefore a most useful servant, ready at a moment's notice. Remember also, that every moment which is lost after the gridiron has delivered up its charge is a delay to the prejudice of the gridiron. From the gridiron to the table without loss of time should be the rule.

The Frying-Pan is less a favorite, in our estimation, than the gridiron; but not to be despised nevertheless. It is a noisy and a greasy servant, requiring much watchfulness. Like the gridiron, the frying-pan requires a clear but not a large fire, and the pan should be allowed to get thoroughly hot, and be well covered with fat before meat is put into it. The excellence of frying very much depends upon the sweetness of the oil, butter, lard, or fat, that may be employed. The frying-pan is very useful in the warming of cold vegetables and other kinds of food, and, in this respect, may be considered a real friend of economy. All know the relish afforded by a pancake—a treat which the gridiron would be unable to afford us. To say nothing of eggs and bacon, and various kinds of fish, to which both the sauce-pan and the gridiron are quite unsuited, because they require that which is the essence of frying —*boiling and browning in fat.*

The Spit is a very noble and a very useful implement of cookery, as ancient, we presume, as it is straightforward at its work. Perhaps the process of roasting stands only second in the rank of excellence in cookery. The process is perfectly sound in its chemical effects upon the food, while the joint is kept so immediately under the eye of the cook, that it must be the fault of that functionary if the joint does not go to the table in the highest state of perfection. The process may be commenced very gradually by the joint being kept a good distance from the fire, and gradually brought forward, until it is thoroughly soaked within and browned without. The spit has this advantage over the oven, and especially over the common oven, that the meat retains its own flavor, not having to encounter the evaporation from fifty different dishes, and that the steam from its own substance passes entirely away, leaving the essence of the meat in its primest condition.

The Dutch Oven, though not so royal an instrument as the spit, is, nevertheless, of great utility for small dishes of various kinds, which the spit would spoil by the magnitude of its operations, or the oven destroy by the severity of its heat. It combines, in fact, the advantages of roasting and baking, and may be adopted for compound dishes and for warming cold scraps. It is easily heated, and causes no material expenditure of fuel.

The Sauce-Pan.—When we come to speak of the sauce-pan, we have to consider the claims of a very large, ancient, and useful family; and perhaps, looking at the generic orders of the sauce-pan, all other cooking implements must yield to its claims. There are large sauce-pans, which we dignify with the name of boilers, and small saucepans, which come under the denomination of stew-pans. There are few kinds of meat or fish which it will not receive and dispose of in a satisfactory manner; and few vegetables for which its *modus operandi* is not adapted. The sauce-pan, rightly used, is a very economical servant, allowing nothing to be lost—that which escapes from the meat while in its charge forms broth, or may be made the base of soups. Fat rises upon the surface of the water and may be skimmed off, while in various stews it combines, in an eminent degree, what we may term the *fragrance* of cookery and the *piquancy* of taste. The French are perfect masters of the use of the stew-pan. And we shall find that, as all cookery is but an aid to digestion, the operations of the stew-pan resemble the action of the stomach very closely. The stomach is a close sac, in which solids and fluids are mixed together, macerated in the gastric juice, and dissolved by the aid of heat and motion, occasioned by the continual contractions and relaxations of the coats of the stomach during the action of digestion. This is more closely resembled by the process of stewing than by any other of our culinary methods.

In this rapid review of the claims of various cooking utensils, we think that we have done justice to each. They all have their respective advantages, besides which they contribute to the *variety* presented by our tables, without which the routine of eating would be very monotonous and unsatisfactory.

There is one process to which we must yet allude—the process of *Spoiling*. Many cooks know how to *produce* a good dish, but too many of them know how to spoil it. They leave fifty things to be done just at the critical moment when the chief dish should be watched with an eye of keenness, and attended by a hand thoroughly expert. Having pent three hours in making a joint hot and rich, they forget that a quarter of an hour after it is taken from the fire may impair or spoil all their labors. The serving up of a dinner may be likened to the assault upon Sebastopol. Looking upon the joint as the Malakoff, and the surrounding dishes as the Redans, the bastions, and the forts, they should all be seized simultaneously, and made the prize of the commander-in-chief and his staff around the dinner table. Such a victory will always do the cook the highest honor, and entitle him to the gratitude of the household.

TO BOIL VEGETABLES.—Put on your pot, make it boil, put a little salt in and skim it perfectly clean before you put in the greens, etc., which should not be put in till the water boils briskly; the quicker they boil the greener they will be.

When the vegetables sink, they are generally done enough, if the water has been kept constantly boiling. Take them up immediately or they will lose their color and goodness. Drain the water from them thoroughly before you send them to the table. This branch of cookery requires the most vigilant attention.

If vegetables are a minute or two too long over the fire they lose all their beauty and flavor.

If not thoroughly boiled tender they are tremendously indigestible, and much more troublesome during their residence in the stomach than underdone meats.

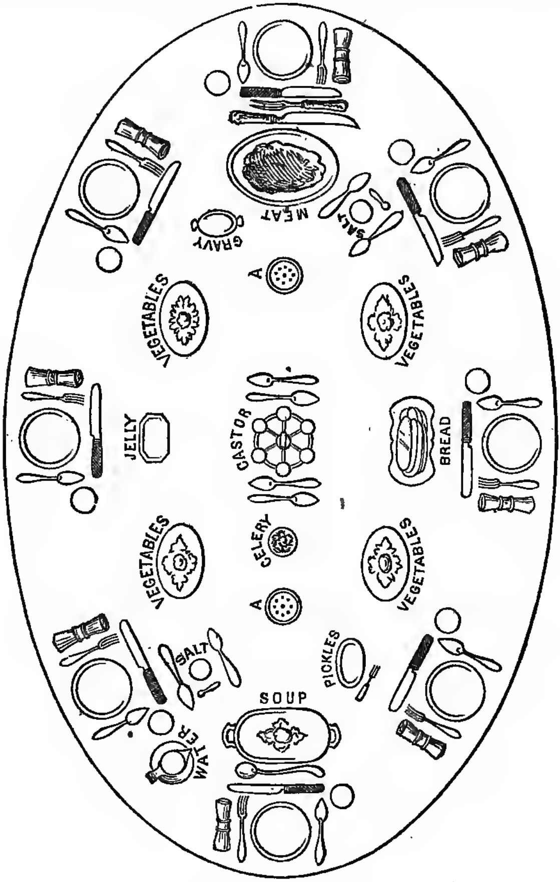
To preserve or give color in cookery many good dishes are spoiled; but the rational epicure, who makes nourishment the main end of eating, will be content to sacrifice the shadow, to enjoy the substance. Once for all, take care your vegetables are fresh, for, as the fishmonger often suffers for the sins of the cook, so the cook often gets undeservedly blamed instead of the green-grocer.

HINTS ON SETTING OUT A TABLE, DEPORTMENT WHILE AT TABLE, etc.

THE accompanying engraving of the manner of "setting a table," we copy from the "American Agriculturist;" and the appended valuable and appropriate instructions are from one of its many careful and able contributors. We earnestly commend it to the attention of our lady readers, by whom the judicious hints will be appreciated:

"I have sketched a table, on which I have arranged a simple dinner, in a style suitable for a family keeping one or two domestics, or none. I have placed the soup on the table with the meat, although, if there be any one whose business it is to wait upon the table, it is better to have the soup served alone, the meat and vegetables being brought on when that is removed. The lady of the house distributes the soup. It is not considered proper, as a general thing, to be helped a second time to soup. The soup plates should be placed by each person, and not in a pile, by the tureen. As each one finishes his soup, his plate may be removed by the waiter, and a plate of meat set before him. If there is no waiter, it is better for each one to retain his plate till all have laid down their spoons, and then one of the family can quietly put them aside.

"There should always be regularity in the laying of a table. The dishes should not look as if they had fallen down like hailstones, wherever it may happen. I have provided for four kinds of vegetables—if there are only two, they may be placed in the middle of the table, opposite the castors. If bread and water are put upon the table, they must be put in some unobtrusive place, and not interfere with the general arrangement. If there are no domestics in the family, a small table, within reach of the lady's hand, may serve as a dumb-waiter, and receive the plates that are to be changed. A waiter, with two shelves and a raised edge about them, as in a butler's tray—or in a trunk tray—is sometimes desirable; and on this the dessert can be placed. There



HOW TO SET A TABLE.*

should be as little leaving the table as possible during meals. If the family wait upon themselves, some one person should do it, and not have a general jumping for a missing article. I have sat at tables where two or three, or even more, would be absent at the same time—

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one, perhaps, for bread, another for water, and others for something else. The *daughters* of a family can take turns in doing this. The lady at the head of the table should never leave her seat, till, by rising, she intimates that the repast is finished. No member of the family should leave the table before all are ready to leave, without asking to be excused by the lady of the house, and it is far better, unless some urgent reason prevents, for all to remain till the close of the meal. It is not now customary for those first served to wait till all are helped, thus insuring to themselves a cold dinner, but each one assumes his knife and fork as his plate is furnished.

"The carver should serve meat as he cuts it, and not dissect a whole fowl at once, or fill his dish with fragments heaped up and lying about like a slaughtered army. Do not help too abundantly to either meat or vegetables. It is easy to pass a plate a second time. The present style is to pass the vegetables, and let each one help himself. In cold weather the plates should always be warmed. It is unpleasant to see gravy stiffening on the plate.

"The seat of honor for a guest is: for a lady, at the right hand of the gentleman; and for a gentleman, a seat at the right hand of the lady who presides at table. The lady of the house leads the way from the parlor to the dining-room—the gentleman follows the others. Where there is company to dine, and much form is to be observed, the most distinguished guest of the gentlemen is invited by the host to escort the lady, and the gentleman of the house takes upon his arm the most distinguished lady visitor.

"Habits of eating are important, and no little straw shows more plainly which way the wind blows, than these show one's acquaintance or want of acquaintance with society. When I was a child, I ate with my knife, and the great lesson was, to teach me to put it to my mouth with the edge from the lips. But now in polite society it is considered as great an offense against propriety to use the knife for any other purpose than to cut the food, as it then was to put it to the mouth in such a way as to be in danger of mingling my blood with my dinner.

"'Don't put your knife in your mouth so—you will cut yourself,' was then the reproof that fell upon the child's ears. Now he hears, or should hear, 'Don't put your knife in your mouth—use your fork.' I advise every child, and every young person, to be very particular in regard to this matter, for, though it may seem unimportant, I am well assured that it is not. Our usefulness depends much on small matters, and whatever custom and good society have made important, is really so, if we would be at home in good society. To use the knife and not the fork betrays want of association with refined life. Above all, do not use the lips to wipe your knife, as I, not long since, saw done by a young gentleman (?). I suppose this did not mar the beauty of his dinner, but I am sure it did of mine. While I would say to the young, Do not put the knife to your mouth any sooner than you would put it to your throat, which simply means, don't do it, I would at the same time say, never allow yourself to be troubled because your father or mother choose to retain the habits of their childhood. They have a right to do so, and no child has a right to treat them with any less respect or reverence because of it. Young persons are apt to do this, and to fail sadly in rendering to their parents the honor that is their due.

"Clear, smooth, white table linen is of the utmost consequence. No table can look well without it. If table linen is starched, it should be only very slightly. If ironed when quite damp, thoroughly ironed, it is glossy and stiff enough. Napkins are now considered essential, and should be found upon the table for breakfast, dinner, and tea. They are very convenient at all times, to say the least. They should be large enough to protect the dress, and yet not as large as towels. It is quite desirable to have ivory, or other rings, numbered or marked with the initials, so that each person may have his own from meal to meal, unless clean napkins are used at every meal, and this makes too much washing, except where an establishment is so large that a laundress is attached to it. Soon after being seated at table, and before handling any thing else, the napkin is quietly taken from the ring, opened, and spread over the lap, and when there is occasion to wipe the mouth, the napkin should be used. A handkerchief is made for another purpose. At the close of the repast, if a ring is furnished, the napkin should be neatly folded and put through the ring. If there is no ring, it may be folded and laid by the side of the plate, or thrown loosely by it, according to the general style in which a family live, the number of domestics, etc. It is easy, by a little observation, to learn what is expected of you. I have been thus particular in regard to the use of the napkin, because I have seen those who did not seem to have any idea what it was for, and consequently did not use it when chancing to dine in families who would quite as soon think of leaving off the table-cloth as the napkins.

"Do not pull the dishes askew as you help from them, and if I happen to dine with you, please do not flood my plate with gravy without asking if I like it, for you would almost certainly spoil *my* dinner, and my taste is like that of many others.

"In waiting upon table have the water poured at the right hand of the one helped; every thing but water should be passed to the left; as the glass stands at the right of the plate, it is convenient to fill it there; it should not be lifted to be filled. In hot weather it is well to have a bit of ice put in each glass before filling it with water. In some families the bits of ice are set upon the table in a glass or china dish, to be used in water or milk, as desired; and this certainly has a refreshing look on a warm summer day. Bread and other things are passed to the left, because it is more convenient to receive them. If passed to the right it is very awkward to take them, unless with the left hand, and that no one ever thinks of doing. The lady of the house should not finish her dinner before her guests, but should *continue to eat* till they lay down their knife and fork. It is extremely awkward for a visitor to find he is keeping a whole family waiting for him, and true politeness requires that we should make our friends, even in the smallest matters, as comfortable as possible.

"When you have eaten all you wish, put your knife and fork side by side upon the plate, in close and loving union, with the handles at the right; and do not push the plate from you, but let it stand where you have used it.

"Never use your own knife or fork to help yourself to salt, butter, vegetables, or any thing else. It is an abomination.

"When you rise from the table do not put the chair back against the wall, or push it under the table, but leave it where it is.

"When jelly or sauce is used at dinner, it does not require a small plate, but should *be put on the dinner-plate.* Have the salts full, and the top nicely smoothed by passing a knife over it. Leave no salt scattered on the top of the glass. Be careful not to forget salt-spoons.

"Do not touch your hair while at table, nor pick your teeth; and, above all, do not suck them—that is enough to drive a person of refinement away from the table. It is worse than going around Point Judith to hear such a sound. The very thought of it is nauseating. It is not customary to put butter on the dinner-table. It is not needed with meat and gravy. Bread is to be eaten with meat—not bread and butter. Bread and butter is for dessert. With baked potatoes, however, butter is necessary, and it might be put upon the table where stand the dishes marked A. That, too, is a suitable place for any extra dish—as radishes in their season. Other condiments, as French mustard, Worcestershire sauce, which do not find a place in the castor, can stand there. Vases of flowers are always beautiful upon the table and exert a most refining influence.

"**The Dessert.**—Let the waiter pass around the table with a small tray in her left hand, in which she collects the silver—the forks and the spoons. When these are removed, she may go around in the same way, a second time, for the knives. The knives and silver are taken separately to prevent scratching the latter. Sometimes a tray with two compartments is used, and if so, the silver and the knives can be taken at the same time. It is better, also, to take the knives and forks in this way rather than on the plates, as it prevents the danger of their sliding from the plates, and thus soiling the dresses on which they might fall. Then the plates are removed, together with the meat and vegetables, the castors, mats, and salts, and every thing but the glasses. The pieces of bread left are taken up with a fork by the waiter and put upon a plate which she carries in her hand. Then, with a crumb-knife, brush, or napkin, she takes off the crumbs into a tray or plate.

"When the table is thus prepared, a dessert-plate, with knife and fork, or spoon, as may be needed, is to be placed before each person. If finger-bowls are used they are put on with the dessert-plate. They should be about one-third full of water. A slice of lemon is sometimes put into each bowl. Colored doylies or napkins are suitable to a dessert of fruit, as white napkins stain so easily.

"The dessert, if it consists of only one dish, should be placed before the lady; if of two, or more, the most substantial should be placed before the gentleman. For a stylish dinner, fruit is brought in after pies and puddings are removed. If this is not done, it is desirable to have separate plates for it. When the fruit is brought on, and the glasses filled, the waiter may be permitted to leave the room.

"When dining ceremoniously, do not take upon yourself the duties of the waiters. Let *them* pass the food; it is not your business at such a time. If there are no waiters, be attentive; observe what is needed by those near you, and pass it without being asked. Yet, in order to help yourself or others, never pass your hand across another's plate, nor reach for what another can hand you.

"If you dine at a table where there are several courses, take them in their proper order, or, if you do not wish them, wait the appropriate time for them. Soup is always served first, and, when dining ceremoniously, take it whether you like it or not. If you cannot eat it, toy with it—so also with fish. Fish should be eaten with the fork only. It is not customary to serve vegetables with fish, except potatoes. They should be whole. Other courses may be declined. You may have heard of the student dining among strangers, who refused every thing upon the table, and when the lady, in polite despair, asked, 'Is there any thing to which I can help you?' replied, 'I will take a piece of pie, if you please.' It is better to eat some things that you do not like than to be guilty of such ill-breeding.

"Do not eat in desperate haste, as if you had not time to attend to the wants of the body God gave you—nor eat your food in immense mouthfuls, nor swallow it without proper mastication. Prepare your food on the plate; put gravy or condiments, or whatever you please on it there, but do not attempt to improve it after you have once raised it from the plate. Do not ask for *meat*, but mention the kind you wish.

"Do not take salt upon your knife and make a great clattering by striking on it with your fork that you may scatter it all over your food at once, but salt each mouthful as you eat it, either by touching it to the salt, or by touching your fork to the salt, and thus seasoning your food.

"Do not lean your arms on the table, nor sit too far back from the table, nor lounge in any way; *carry your food to your mouth instead of your mouth to the food.*

"Never use your own knife to help yourself. It is no more proper to do it than to help yourself from your neighbor's plate, and it is exceedingly unpleasant to those who must be helped after you, unless they are equally regardless of the delicacies of life.

"If accidents happen at table, do not notice them. It is bad enough to tip over a tumbler and deluge the cloth without having every eye turned upon you in consequence of it, and every mouth utter a prolonged 'oh!' Rather make as little of it as possible, quietly laying a napkin over it.

"Do not urge your friends to eat more than they desire, *nor apologize for your dinner.* If it is good enough for your family it is good enough for your friends. If your cooking has been unsuccessful too many apologies do not improve it. Especially, do not offer apology for that which does not require it. It looks too much like fishing for compliments. It is not in good taste to crowd a table with a great variety of food. Bread for dinner, as it is not to be eaten with butter, should be cut in thick slices, and then cut in rather small pieces.

"The extension table, like the one represented in the engraving, is the most desirable one for the dining-room. Do not, in going to the table, or in leaving it on any occasion, send your guests in advance of you, as you would 'shoo' a flock of turkeys, but yourself *precede* them. It is exceedingly awkward for a stranger to be thus thrust forward in another person's house.

"**Deportment at Table.**—It is not as customary now as formerly to ask what part of a fowl is preferred. It is taken for granted that every one likes a piece of the breast, and after that is put upon the plate the carver may inquire, 'Shall I send you this, or is there any other part that you prefer?' If the question is asked, 'What part do you prefer?' it is necessary to carve but few pieces before the chosen bit can be reached, unless the choice should be a back-bone, and that is not generally preferred. After the wing and leg of a fowl are cut any piece is accessible at once. As these are laid upon the dish the crisp skin should be up and not next the dish. If there is stuffing, it should not be scattered carelessly over the meat. Neatness is just as desirable on a plate as in a parlor. When a slice of fowl is put upon a plate the brown side should be up; if there be only a brown edge, that should be toward the outside of the plate, that it may not lose its delicate crisp by contact with gravy or vegetables.

"If you are asked what part you like, give a definite answer. Do not say 'it is immaterial,' nor 'I have no choice.' Such answers only embarrass a carver, and well might tempt him to pass to another person while you are left in your indecision. It is easy enough to say, 'I will take a piece of the white meat,' or, 'I will take a piece of the dark meat,' or even, as I heard a young lady reply, 'Any piece but the wing.'

"Do not remove a part of a fowl from the dish to a plate to complete the carving. To receive such a dish might spoil the dinner of a fastidious person.

"Vegetables should be put neatly and compactly upon the plate and not scattered over it. Gravy should be put on the plate, not on the meat or vegetables.

"The fork, in 'passing the food,' may be held in either hand as is most convenient. If used as a spoon, it should be held in the right, as for pease, tomatoes, squash, etc. If used for a fork, then the left hand may hold it. Only a few mouthfuls of food, if any, should be cut before beginning to eat.

"When the fork is held in the right hand, it is often convenient to use a bit of bread to push vegetables, like pease or tomatoes, upon the fork. I of course refer to forks with three or four tines, as they are now usually made, when I speak of eating pease with a fork.

"**Breakfast.**—This is not a ceremonious meal, nor a dress occasion. Low necks and short sleeves, laces and jewelry, are entirely out of place at the breakfast table. Linen collars, or those of thick cambric, with sleeves or cuffs to correspond, are designed for morning. Neat muslins, or prints, delaines, or very simple silks, plainly made, are proper, but rich silks and flounces, and heavily trimmed dresses are in bad taste at this meal. And I may here add, that it is decidedly vulgar to flounce merino or delaine, or any cheap material. No *lady* ever wears such a dress. No morning-dresses can be prettier than those open in front, worn over a fine white skirt. On a sewing-machine these skirts can be very neatly tucked in a few minutes. It is quite as important that the hair should be neatly arranged at breakfast as at dinner, but the head-dress should be very simple.

"For morning work a dress that can be washed is most desirable, although for winter something warmer may be necessary. My fancy was once much pleased by a gray cloth basque worn by a friend of mine. Such an article can be as easily dusted as a gentleman's coat.

"Pies should never be eaten at breakfast, but it is now the style to have fruit on the breakfast-table.

"In pouring coffee, the sugar and cream should first be put into the cup, and the coffee poured on. If milk is used for coffee, it should be brought to the table scalding hot. I like the 'Old Dominion Coffee-pot,' as, with good materials, it is impossible to make poor coffee in it, if the directions are followed. If I lived in the country, as I do not chance to do just now, I would have cream very rich and thick for coffee, and the coffee made strong and weakened with scalded milk; but as it is, I am compelled to be content with only the milk. For tea the sugar and cream should be put in the cup after it is filled. I do not like brown sugar in coffee, any better than in tea; it injures its delicate purity.

"It is not customary, in good society, to load a tea-table with all that can be placed upon it; one or two kinds of cake and sweetmeats, with bread and butter or biscuit, are sufficient for most occasions. A little dried beef, or thinly-sliced tongue, is not out of place after an early dinner, but where a family dines late it is wholly unnecessary.

"Bread for tea should be cut in very thin slices. In many families the loaf is placed upon the table, and cut from as it is needed. This prevents the waste of bread or the accumulation of dry pieces. It is convenient to have a bread-board for this purpose. A bread-knife is much like a carving-knife, but the thinner the blade the better.

"Cup-plates are out of date. Coffee and tea are drank from the cup, not from the saucer. The spoon should be placed in the saucer while drinking."

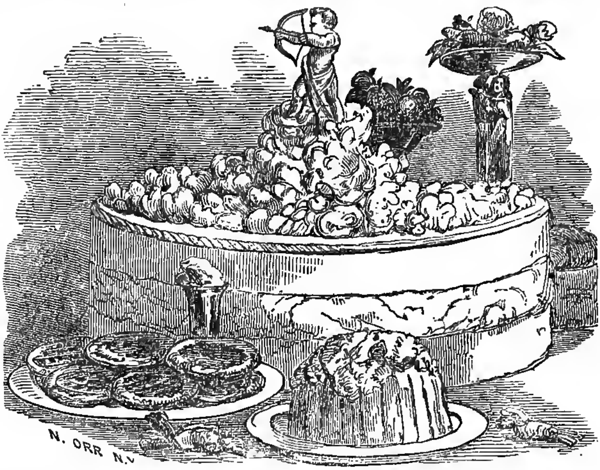
DETAILS OF PRACTICAL COOKERY.

In this department of our work we shall not give the thousand and one different methods of doing the same thing; but shall confine our attention to those valuable and reliable recipes and directions which are needed in every well-regulated household, and on which dependence can be placed.

BREAD AND BREAD-MAKING.—First among the duties of every mistress of a family, is to know how to make light, sweet, and healthy bread.* The "staff of life" forms so large a part of the food of every

* Bread contains eighty nutritious parts in one hundred; meal thirty-four in one hundred; French beans ninety-two in one hundred; common beans eighty-nine in one hundred; pease ninety-three in one hundred; lentils ninety-four in one hundred; cabbages and turnips, the most watery of all the vegetables we here name, produce only eight pounds of solid matter in one hundred; carrots and spinach produce

family, that economy, health, and comfort alike dictate that the best process of making it should be well and generally understood and practiced. The first and indispensable requisite of good bread is good flour; and to have this, and avoid the mixtures and adulterations so



common among flour, and all other manufacturers and dealers, is *to grow or buy your own wheat*, *make your own yeast*, and *bake your own bread;* and for all which we give ample and reliable directions. If you buy flour, the following simple method of testing it may be useful:

To Test Flour, people in the trade generally knead a small quantity by way of experiment; if good, the flour immediately forms an adhesive elastic paste, which will readily assume any form that may be given to it without danger of breaking. Pure and unadulterated flour may likewise be easily distinguished by other methods; seize a handful briskly and squeeze it half a minute; it preserves the form of the cavity of the hand in one piece, although it may be rudely placed on the table; not so that which contains foreign substances, it breaks in pieces more or less; that mixed with whiting being the most adhesive, but still dividing and falling down in a little time.

Whiting can be detected, by dropping into the flour lemon-juice or strong vinegar, when, if whiting be mixed with it, a fermentation, like the effect of yeast, is produced, otherwise the flour remains at rest.

To Discover whether Flour be adulterated with Chalk, Plaster of Paris, or Mineral Powders.—If containing these admixtures, it will be

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fourteen in the same quantity; while one hundred pounds of potatoes contain twenty-five pounds of dry substance. From a general estimate, therefore, it results, that one pound of good bread is equal to two pounds and a half or three pounds of potatoes; that seventy-five pounds of bread and thirty of meat are as nutritious as three hundred pounds of potatoes. The other substances bear the following proportions: four parts of cabbage to one of potatoes; three parts of turnips to one of potatoes; two of carrots and spinach to one of potatoes; and about three and one half parts of potatoes to one of bread, beans, lentils, and pease.

found to be heavier, measure for measure, than pure flour. That is to say a pint of pure flour would be overbalanced in the scales by a pint of adulterated flour. Slice the soft part of a loaf, and put it into a large quantity of water in an earthen vessel. Place it over a slow fire for three hours. Scoop up the pap, and let the water stand. When perfectly settled pour off the water, and a chalky sediment will be found to cover the bottom of the vessel. Heart-burn, after eating impure bread, is a sign of its impurity. Put some flour upon a table, and blow it gently with the breath. If little heaps remain upon the table, resisting the action of the breath, and differing manifestly from the indications given by other portions when blown upon, the substance thus remaining is impure. Potato flour, and indeed all white flours, are heavier than pure wheat. Bake a small quantity of the suspected flour, until it is of a full brown. Then take it and rub in your hands or on a table, and white particles will be seen, if chalk or plaster of Paris be present. Run into a loaf that is one day old a knife made very hot; if there be alum present it will adhere in very small particles to the blade of the knife, and will indicate its presence by a peculiar smell. If bread looks unnaturally white, and if it gives off a good deal of water, and becomes very brittle and dry when toasted, alum may be regarded as being present.

To Discover whether Bread be adulterated with Pea or Bean Flour.—Pour boiling water upon it, and if the flour is mixed with the farina of pease or beans, the strong smell of those grains will become manifest.

YEAST.—Having good flour the next requisite is good yeast. Boil two ounces of the best hops in four quarts of water for half an hour, strain it, and let the liquor cool down to new-milk warmth, then put in a small handful of salt, and half a pound of sugar; beat up one pound of the best flour with some of the liquor, and then mix all well together. The third day, add three pounds of potatoes, boiled and then mashed, to stand till the next day; then strain it and put it into bottles, and it is ready for use. *It must be stirred frequently while it is making, and kept near the fire.* Before using, shake the bottle up well. It will keep in a cool place for two months, and is best at the latter part of the time. The beauty of this yeast is, that it ferments spontaneously, not requiring the aid of other yeast; and if care be taken to let it ferment well in the earthen bowl in which it is made, you may cork it up tight when bottled. The quantity above given will fill four seltzer-water bottles. The writer of the above receipts has used this yeast and never had lighter bread than it affords, and never knew it to fail.

Domestic Yeast.—Ladies who are in the habit (and a most laudable and comfortable habit it is), of making domestic bread, cake, etc., are informed, that they can easily manufacture their own yeast by attending to the following directions:—boil one pound of good flour, a quarter of a pound of brown sugar, and a little salt, in two gallons of water, for one hour. When milk-warm, bottle it, and cork it close. It will be fit for use in twenty-four hours. One pint of this yeast will make eighteen pounds of bread.

Yeast-Cakes.—Make a thick batter of a pint of good yeast, a teaspoonful of salt, and rye or wheat flour. When risen, stir in Indian meal till of the right consistency to roll out. When risen again, roll them out very thin, cut them into cakes with a tumbler, and dry them in the shade in clear, windy weather. Care must be taken to keep them from the sun, or they will ferment. When perfectly dry, tie them up in a bag, and keep them in a cool, dry place. To raise four or five loaves of bread, take one of these cakes and put to it a little lukewarm milk or water. When dissolved, stir in a couple of tablespoonfuls of flour; set it near the fire. When light, use it for your dough. Yeast-cakes will keep good five or six months. They are very convenient to use in summer, as common yeast is so apt to ferment.

To Make Prime Yeast.—Boil twelve clean-washed, middle-sized potatoes; and at the same time boil, in another vessel, a handful of hops in a quart of water; peel and mash the potatoes fine; pour part of the hop-water, while hot, upon the potatoes, and mix them well; then add the remainder of the hop-water, and a spoonful of sugar; beat all well; add a small portion of leaven to bring on fermentation, and set it in a cool place. One cupful of the above potato-yeast will answer for two quarts of flour.

BREAD—DIFFERENT KINDS—Home-made Bread.—To three pounds and a half of flour add a dessert-spoonful of salt, and mix them well; mix about two tablespoonfuls of good fresh yeast (see *ante*) with half a pint of water a little warm, but not hot; make a hole with your hand in the middle of the flour, but not quite touching the bottom of the pan; pour the water and yeast into this hole, and stir it with a spoon till you have made a thin batter; sprinkle this over with flour, cover the pan over with a dry cloth, and let it stand in a warm room for an hour—not near the fire, except in cold weather, and then not too close; then add a pint of water a little warm, and knead the whole well together, till the dough comes clean through the hand; some flour will require a little more water, but in this experience must be your guide; let it stand again for about a quarter of an hour, and then bake at pleasure.

French Bread and Rolls.—Take a pint and a half of milk; make it quite warm; half a pint of small-beer yeast; add sufficient flour to make it as thick as batter; put it into a pan; cover it over, and keep it warm: when it has risen as high as it will, add a quarter of a pint of warm water, and half an ounce of salt—mix them well together; rub into a little flour two ounces of butter; then make your dough, not quite so stiff as for your bread; let it stand for three-quarters of an hour, and it will be ready to make into rolls, etc.—Let them stand till they have risen, and bake them in a quick oven.

A Great Increase on Home-Made Bread, even equal to one-fifth, may be produced by using bran-water for kneading the dough. The proportion is three pounds of bran for every twenty-eight pounds of flour, to be boiled for an hour, and then strained through a hair-sieve.

Economical and Nourishing Bread.—Suffer the miller to remove from the flour only the coarse flake bran. Of this bran boil five or six pounds in four and a half gallons of water; when the goodness is extracted from the bran, during which time the liquor will waste one-half or three-quarters of a gallon, strain it and let it cool. When it has cooled down to the temperature of new milk, mix it with fifty-six pounds of flour, and as much salt and yeast as would be used for other bread; knead it exceedingly well; let it rise before the fire, and bake it in small loaves: small loaves are preferable to large ones, because they take the heat more equally. There are two advantages in making bread with bran-water instead of plain water; the one being, that there is considerable nourishment in bran, which is thus extracted and added to the bread—the other, that flour imbibes much more of bran-water than it does of plain water; so much more, as to give, in the bread produced, almost a fifth in weight more than the quantity of flour made up with plain water would have done. These are important considerations to the poor. Fifty-six pounds of flour, made with plain water, would produce sixty-nine and a half pounds of bread; made with bran-water, it will produce eighty-three and a half pounds.

Boston Brown Bread.—A person once accustomed to this bread will never willingly live without it. To make it, take one quart of rye meal, two quarts of Indian meal—if not fresh, scald it—half a teacupful of molasses, two teaspoonfuls of salt, one teaspoonful of saleratus, one teacupful of home-brewed yeast, or half the quantity of distillery yeast; make it as stiff as can be stirred with a spoon, with warm water, and let it rise from night till morning. Then put it into a large, deep pan, smooth the top with the hand, dipped in cold water, let it stand a few minutes, and then bake it in an oven five or six hours. If put in late in the day, it may remain in the oven over night.

Premium Bread.—The Rhode Island Society for the Promotion of Industry gave the first premium on domestic bread to Mrs. Hiram Hill, of Providence. The following is Mrs. Hill's recipe for making the bread exhibited by her: for two loaves of the ordinary size, take two potatoes, pare them, slice very thin, and boil quick until quite soft; then mash it to a fine pulp, and add, little by little, two quarts of boiling water, stirring until a starch is formed; let this cool, and then add one-third of a cup of yeast. This forms the "sponge," which should remain in a moderately warm place for ten or twelve hours, or over night, until it becomes very light and frothy; even if a little sour, it is of no consequence. When the "sponge" is ready, add flour, and work it in until you have formed a stiff, firm mass. The longer and more firmly this is kneaded, the better the bread. Let the kneaded mass remain, say from half to three-quarters of an hour to rise, then divide into pans, where it should remain, say fifteen minutes; care being taken that it does not rise too much and crack; then put the loaves into a quick oven, and bake, say three-quarters of an hour. If the oven is not hot enough, the bread will rise and crack; if too hot, the surface will harden too rapidly, and confine the loaf.

Brown Graham Bread.—One quart superfine flour, one quart unbolted flour, and one pint Indian meal, sifted and scalded. Add a little molasses, if preferred. Mix as wheat, using yeast, salt, etc. Bake when light.

A Rich Corn Bread.—Take one egg, well beaten; half a pint of thick cream; Indian meal sufficient to form a thick batter; a small quantity of salt; add half a teaspoonful of saleratus, dissolved in a small quantity of water; after mixing thoroughly, put it into the pans or oven, and bake immediately.

Wheat and Indian Bread.—Add to three pints of boiling water a large tablespoonful of salt, stir into it sweet white corn meal, until it is a thick batter; continue to stir it for ten minutes, that it may not burn, then turn it into a dish, stir into it a quart of cold water; when it is cool enough to bear your hand in it, pour it into a bowl, in which is seven pounds of wheat flour, heaped around the sides, so as to leave a hollow in the center; add to it a gill of baker's yeast, and half a teaspoonful of saleratus, dissolved in a little hot water; then work the whole into a smooth dough, work it or knead it for nearly an hour, then strew a little flour over it, lay a thickly-folded cloth over, and set it in a warm place for five or six hours in summer, or mix at night in winter; when light, work it down, set it to rise again for one hour, then heat the oven, work the bread down, and divide it in loaves, and bake, according to their size, in a quick oven; when taken from the oven, turn them over in the pans, and set them to become cold; if the crust is hard, wrap them in a towel as soon as taken from the oven.

Having used the following, we can bear testimony to its truth and importance:

Use of Lime-Water in Making Bread.—It has lately been found that water saturated with lime produces in bread the same whiteness, softness, and capacity of retaining moisture, as results from the use of alum; while the former removes all acidity from the dough, and supplies an ingredient needed in the structure of the bones, but which is deficient in the *cerealia*. The best proportion to use is, five pounds of water, saturated with lime, to every nineteen pounds of flour. No change is required in the process of baking. The lime most effectually coagulates the gluten, and the bread weighs well; bakers must, therefore, approve of its introduction, which is not injurious to the system, like alum, etc.

Milk-Emptyings Bread.—To one and a half pint of water, add one-fourth teaspoonful of salt, one-fourth teaspoonful of saleratus, two tablespoonfuls of new milk; pour the water on those articles boiling hot; let it stand and partially cool; then stir as pancake batter; put in a vessel with warm water, and cover the whole carefully. When light, sponge it, and let it stand one hour, mix it, put it in tins, and let it stand in a warm place another hour, when it is ready to bake.

Yankee Bread.—One quart of sweet milk, one pint of sour, three pints of meal, one pint of flour, one cup of molasses, one teaspoonful of saleratus, a little salt; bake six hours; it is best while warm.

Potato Bread.—Boil a quantity of potatoes; drain them well, strew over them a small quantity of salt, and let them remain in the vessel in which they were boiled, closely covered, for an hour, which makes them mealy; then peel and pound them as smooth as flour. Add four pounds of potatoes to six of wheat flour, and make it into dough with yeast, in the way that bread is generally made. Let it stand three hours, to rise.

Rye Bread.—Take two quarts of wheat flour, two pounds of rye flour, a little salt, a fourth of a pint of good yeast, and as much warm water as will make it into stiff dough. Let it stand three hours to rise before you put it into the oven. A large loaf will take three hours to bake.

Excellent Biscuits.—Take of flour two pounds; carbonate of ammonia, three drachms, in fine powder; white sugar, four ounces; arrowroot, one ounce; butter, four ounces; one egg; mix into a stiff paste with new milk, and beat them well with a rolling-pin for half an hour; roll out thin, and cut them out with a docker, and bake about fifteen minutes in a quick oven.

Soda Biscuits.—Take one quart of flour, two teaspoonfuls of cream of tartar, one teaspoonful of salt, one of saleratus or soda, and a small piece of butter for shortening; mix with water or milk.

Another Kind.—One pound of flour, two teaspoonfuls of cream of tartar, one teaspoonful of soda. Put the cream of tartar into the flour dry; dissolve the soda in a little milk; wet the whole with milk, making it sufficiently stiff to mould into biscuits.

Potato Biscuits.—Boil mealy potatoes very soft, peel and mash them. To four good-sized potatoes, put a piece of butter of the size of a hen's egg, and a teaspoonful of salt; when the butter has melted, put in half a pint of cold milk. If the milk cools the potatoes, put in a quarter of a pint of yeast, and flour, to make them of the right consistency to mould up. Set them in a warm place; when risen, mould them up with the hand; let them remain ten or fifteen minutes before baking them.

Butter Biscuits.—Half a pound of butter, two pounds of flour sifted, half a pint of milk, or cold water, a teaspoonful of salt; cut up the butter in the flour, and put the salt to it, wet it to a stiff dough with the milk, or water; mix it well with a knife, throw some flour on the paste-board, take the dough out of the pan, and knead it very well; roll it out into a large, thick sheet, and beat it very hard on both sides with the rolling-pin; beat it a long time, cut it out with a tin, or cup, into small, round, thick cakes. Beat each cake on both sides with a rolling-pin, prick them with a fork, put them in buttered pans, and bake them of a light brown in a slow oven.

RUSKS.—**Tea-Rusk.**—To a pint of warm milk add a half-gill of baker's yeast, a half-teaspoonful of saleratus, and a little salt; put to it enough wheat flour to make a soft dough; mix well and smooth, cover it and set it in a warm place; when light, add a half tea-cup of sugar, and a cup of melted butter; work them well into the dough; flour your hands well, and make into small cakes; lay them close together in a buttered pan; dip a little sweetened milk and pass it lightly over the tops of the rusks; bake in a quick oven for half an hour and serve hot.

Another Kind.—Five pounds of flour, one and a half pounds of sugar, one pound of butter, five eggs, one pint of yeast, one ounce of spice, on quart of new milk; mix the flour, milk, and yeast together over night add the rest in the morning, and let it rise again; put it in the pans, and set it to the fire till the oven is ready; gloss the tops with whites of eggs and milk.

Rolls.—Mix the salt with the flour. Make a deep hole in the middle. Stir the warm water into the yeast, and pour into the hole in the flour. Stir it with a spoon just enough to make a thin batter, and sprinkle some flour over the top. Cover the pan, and set it in a warm place for several hours. When it is light, add half a pint more of lukewarm water, and make it, with a little more flour, into a dough. Knead it very well for ten minutes. Then divide it into small pieces, and knead each separately. Make them into round cakes or rolls. Cover them, and set them to rise about an hour and a half. Bake them, and when done, let them remain in the oven, without the lid, for about ten minutes.

Light Rolls.—Take a piece of risen dough, the size of a small loaf, from mixed bread, work into it a tea-cup of shortening, and one egg, work it well together, then make it in rolls between your hands, about one inch thick, and the length of the finger; lay them close in a buttered basin, and bake fifteen minutes in a quick oven: do not open the oven until that time has expired, then wet the tops of the rolls over with a little milk and close the oven for five minutes longer.

French Rolls, *for Tea.*—Work a quarter of a pound of butter into two pounds of sifted wheat flour, until it is like grated bread, put to it two beaten eggs, two tablespoonfuls of baker's yeast, half a teaspoonful of salt, and as much warm milk as will make a soft dough, strew flour over, cover it with a warm cloth, and set it in a warm place to rise for two hours; then dip your hands in flour, and make it in small rolls an inch thick and the length of the finger, bake twenty minutes in a quick oven; five minutes before they are done, wet them lightly over with sweet milk, do it as quickly as possible, and close the oven to finish.

CAKES.—We shall not imitate those authors who give directions for making hundreds of different kinds of cakes, believing that a few choice kinds, on the directions for making which our readers can fully rely as the best in the whole category, will be more useful and acceptable than the whole mass, as the difficulties of finding, and the confusion of selecting what is desired, are thus avoided.

Requisite Information for Making and Baking Cakes.—Currants are so frequently used in cakes that you should be very particular in having them nicely washed, dried, and all sticks and stones taken from them, and then put before the fire to dry, as, if damp, they will make cakes and puddings heavy; therefore, before you use them, dust a little flour lightly over them. Raisins, if they are to be used whole, should be well scalded; if to be chopped, throw a few at a time into hot water, then cut each one with scissors, and take out the seeds.

Eggs should be fresh and a long time beaten, the whites and yolks separate, taking out the treadle.

Sugar should be well pounded and sifted, and kept well dried. None but good sweet butter should be used for cake-making.

In making cakes, if you wish them to be pleasing to the eye as well as the palate, use double-refined white sugar, although clean brown sugar makes an equally good cake.

Lemon-peel should be either rubbed on sugar or grated fine; if so, sprinkle some sifted sugar among it to keep it a good color.

The lightness of cake depends upon its being well beaten and thoroughly mixed.

If you use yeast to your cakes, they will require less butter and eggs, and will eat almost equally as light and rich; but if the leaven be only of milk, flour, and water, it becomes more tough than if the butter was at first put with the ingredients, and the dough set to rise by the fire. Yeast should be used sparingly to avoid bitterness.

The heat of your oven is of particular importance for baking cakes or pastry—more particularly large cakes; as at first, if not pretty brisk, they will not rise; then, if likely to brown too quick at the top, put a piece of paper upon the top of the cake so as not to touch the batter. It should be lighted some time beforehand, so as to have a good solid body of heat, and should be of a proper heat at the bottom, in order that the cakes may rise.

For baking plum or other large cakes, have round tin pans, with sides nearly perpendicular; line them with white paper buttered, and fill them two or three inches deep of the cake mixture, but not more.

Saleratus must be powdered and dissolved in hot water before being used.

When the weather is cold, the materials for cake should be moderately warmed before mixing them together. All kinds of cake that are made without yeast are better for being stirred, till just before they are baked. The butter and sugar should be stirred together till white, then the eggs, flour, and spice added. Saleratus and cream should not be put in till just before the cake is baked; add the fruit last. Butter the cake-pans well. The cake will be less liable to burn if the pans are lined with white buttered paper.

An oven for bread-baking should be as hot as you can bear your hand in for twenty seconds, or while counting twenty.

To ascertain whether a cake be done, thrust a knife into the center, and should this come out clean, draw it from the oven directly; but should the paste adhere to it, continue the baking. Several sheets of paper are placed usually under large plum-cakes.

To blanch almonds, put them into a sauce-pan with plenty of cold water, and heat it slowly; when it is just scalding, turn the almonds into a basin, peel, and throw them into cold water as they are done; dry them well in a soft cloth before they are used. If the water be too hot, it will turn them yellow.

Bread and tea-cakes made with milk are best when new, as they become stale sooner than others.

Never keep your bread or cake in wooden boxes or drawers, but in tin boxes or earthen pans, with covers.

When the quantities given will make more cake than is required, the half of each ingredient may be used.

Allow about fifteen minutes for each half-inch in thickness of the cake in a quick oven. More time will be required in a slow oven.

Crust, Short and Rich, but not Sweet.—To eight ounces of fine flour rub in well six ounces of butter; make it into a stiffish paste with a little water; beat it well, roll it thin, and bake it in a moderate oven.

Crust, Short.—Take two ounces of white sugar, pound, sift, and dry it, mix it with a pound of well-dried flour, and rub well into it three ounces of butter; put the yolks of two eggs into some cream, and then mix the whole into a smooth paste; roll it out thin and bake it in a moderate oven.

Apple-Cake.—Take one pound and a half of white sugar, two pounds of apples, pared and cut thin, and the rind of a large lemon; put a pint of water to the sugar, and boil it to a syrup; put the apples to it, and boil it quite thick. Put it into a mould to cool, and send it cold to table, with a custard or cream poured round it.

Jelly Cake.—Three eggs, one and a half cups of cream, two of sugar, one half-teaspoonful of soda, and flour to make a thin batter; spread as thinly as possible on buttered tins. Take off the tins while hot, and place a thin layer of currant jelly between the layers of cake.

Grandmother's Cake.—Six eggs, twelve tablespoonfuls of lard, one teaspoonful of salt, and one cup of sugar; roll thin, cut the dough in small pieces, cut the center in narrow strips, leaving the ends whole; fry in hot lard; and if you say they are not good, it will be because you do not make them as grandmother did.

Cookies.—Take half a pound of sugar, one-fourth of a pound of butter; stir them well together; dissolve a teaspoonful of saleratus in three-fourths of a tea-cup of sweet milk; add half a nutmeg, grated, and flour sufficient to roll them out easily. Bake in a moderately heated oven.

Johnny Cake.—Put a quart of fresh corn-meal into a basin, add a heaping teaspoonful of salt, stir into it boiling water, until it is all moistened; then, with your hands, make it in cakes half an inch thick, and bake them on a hot griddle, rubbed over with a bit of fat pork, or beef suet; let them do slowly; when one side is done, turn the other; they may be baked in an oven for twenty minutes; or put the cake on a flat board or iron plate, and slant it in front of the fire; when one side is done, turn the other; serve hot, split them open, and butter freely. They may also be made with a quart of milk, three eggs, one teaspoonful of carbonate of soda, and one teacupful of wheaten flour; add Indian corn meal sufficient to make a batter like that of pancakes, and either bake it in buttered pans, or upon a griddle, and eat them with butter.

Tea Cakes.—Take of flour, one pound; sugar, one ounce; butter, one ounce; muriatic acid, two drachms; bicarbonate of soda, two drachms; milk, six ounces; water, six ounces; rub the butter into the flour; dissolve the sugar and soda in the milk, and the acid in the water; first add the milk, etc., to the flour, and partially mix; then the water and acid, and mix well together; divide into three portions, and bake twenty-five minutes. Flat round tins or earthen pans are the best to bake them in. If the above is made with baking-powder, a teaspoonful may be substituted for the acid and soda in the above receipt, and all the other directions carried out as stated above. If buttermilk is used, the acid, milk, and water must be left out.

Another.—Rub a quarter of a pound of butter into a pound of flour; add a quarter of a pound of fine loaf-sugar, a few caraway seeds, and two eggs. With a little warm milk let the whole be made into a paste, which, being covered with a cloth, is to stand before the fire nearly an hour. Then roll out the paste, cut it into round cakes with the top of a glass, and bake them upon floured tins.

Unfermented Cake.—Take of flour, one pound and a half; bicarbonate of soda, three drachms; muriatic acid, three drachms; sugar, one ounce and a half; butter, one ounce and a half; milk, twenty ounces; currants, six ounces, more or less. Mix the soda and butter into the flour by rubbing them together; next dissolve the sugar in the milk, and diffuse the acid through it by stirring; then mix the whole intimately, adding fruit at discretion; and bake in a tin or earthen pan.

Luncheon Cakes.—Take of flour, one pound; muriatic acid, two drachms; bicarbonate of soda, two drachms; sugar, three ounces; butter, three ounces; currants, four ounces; milk, one pint or twenty ounces; bake one hour in a quick oven.

Nice Plum-Cake.—Take of flour, one pound; bicarbonate of soda, a quarter of an ounce; butter, six ounces; loaf-sugar, six ounces; currants, six ounces; three eggs; milk, about four ounces; bake one hour and a half in a tin or pan.

Lemon Buns.—Take of flour, one pound; bicarbonate of soda, three drachms; muriatic acid, three drachms; butter, four ounces; loaf-sugar, four ounces; one egg; essence of lemon, six or eight drops; make into twenty buns, and bake in a quick oven fifteen minutes.

Loaf-Cake.—Six pounds of flour, three pounds of butter, three pounds of sugar, one and a half-dozen of eggs, three pounds of raisins, half an ounce each of mace and nutmegs, half a pint of wine, milk to wet the whole, with yeast; first put the flour, half the butter, half the sugar, and the yeast together; then raise it: then add the rest well mixed; put into pans for baking, using nutmeg and cinnamon according to taste.

Plum-Cake.—Take nine pounds of flour, nine fresh eggs, three pounds of fine sugar, one pint of yeast, one spoonful of rose-water; spice according to your own taste, and milk sufficient to wet it. Knead it thoroughly, and bake it by a moderate but quick fire.

Wedding-Cake.—Take eighteen pounds of flour, ten pounds of fine sugar, nine pounds of butter, eleven nutmegs, eighteen eggs, five quarts of milk, one quart of yeast, ten pounds of fruit, one ounce of mace, one quart of wine, and one pint of brandy. The butter and sugar are to be rolled together; the other materials are then to be mixed with the butter and sugar, putting the fruit in last, when nearly ready for the oven.

Icing or Frosting for Cake.—Take two pounds of double-refined sugar, beat and sift it through a fine sieve; put into it a spoonful of starch, a pennyworth of gum-arabic; beat them all well together; take the whites of four or five eggs, beat them well, and put in a spoonful of rose-water, a spoonful of lemon-juice; beat them with the eggs; then mixing and beating the whole together, till the cakes come from the oven, when the frosting is to be applied.

Dough-Nuts or Nut-Cakes.—While your lard is melting to boil your cakes, mix two cups of buttermilk and two of cream, with two or three eggs, one teaspoonful of saleratus, and plenty of fine cinnamon, and flour enough to roll; made in this way, they are more tender, and less liable to harden than when raised with yeast.

Buckwheat-Cakes.—To three pints of buckwheat flour, mixed into a batter, add one teaspoonful of carbonate of soda dissolved in water, and one teaspoonful of tartaric acid dissolved in like manner; first apply the carbonate, stir the batter well, and then put in the acid; thus the use of yeast is entirely superseded, and light cakes are insured. One great advantage is, that the batter is ready for baking as soon as made.

Fritters.—Make a batter of eggs, flour, and milk. Apple fritters are made by cutting large pared apples in slices, dipping the slices in batter, and frying them separately. They are done when slightly browned on both sides. Another, and perhaps a more common way, is to cut the apples in small pieces, and mix them with the batter, frying them, a spoonful in each fritter. Fritters may be made with currants in the same manner. All fritters should be sprinkled over with fine sugar.

Griddle-Cakes.—Best way to make them is to use milk altogether, instead of water; two eggs being allowed for a pint of corn meal; the milk being a little warmed, and the whole to be well beaten up with a spoon or ladle. There must be milk enough used to make the whole so liquid as that it will pour out of the sauce-pan on the griddle. A spoonful of wheat flour and lard of the size of a walnut may be added.

Rice Sponge-Cake.—Nine eggs, the weight of them in sugar; the weight of six in rice-flour; have the sugar finely sifted; mix the sugar and rice together; have the whites and the yolks beat separately; pour the eggs at the same time into the rice and sugar; beat the whole together about a quarter of an hour, and then add of the essence of lemon twenty drops, or rose-water.

Washington Cake.—Take two pounds of flour, one quart of milk, with an ounce of melted butter; put the milk and butter into the flour when about lukewarm; add a pennyworth of yeast, three eggs, and a tea-spoonful of salt; place it in pans over the night, and bake it in the morning in an oven for three-quarters of an hour. This is a favorite cake in Virginia, and derives its name from General Washington, who was particularly fond of it.

Drop-Cakes.—Let a large teaspoonful of saleratus be dissolved in a cup of cream, and this mixed with a quart of milk. Into this stir flour gently, till of the consistence of batter. Then dip your spoon in milk, and with it place your batter at short distances, in a buttered pan. Very delicate made entirely of cream, either with or without eggs.

Sponge-Cakes.—Take nine eggs, and beat them, yolks and whites separately, an hour or so. With the eggs then beat one pound of fine loaf-sugar, till the whole is of a foam. Afterward stir in gently twelve ounces of flour, also grating in a nutmeg and a little cinnamon or mace. The mixture is then to be put in buttered tins, filled only half-full, and baked half an hour; or, a large loaf should be baked an hour. The oven should be heated to bake quick, but not to scorch.

Yellow Lady-Cake.—*A new way to make it.*—Take a pound of fine white sugar, with half a pound of butter beaten to a cream, the yolks of eight eggs beaten smooth and thick, one cup of sweet milk, a small teaspoonful of powdered volatile salts or saleratus, dissolved in a little hot water; half a nutmeg grated, a teaspoonful of lemon extract or orange-flower water, and as much sifted wheat flour as will make it as thick as pound-cake batter: beat it until it is light and creamy, then, having taken the skins from and beaten to paste a quarter of a pound of shelled almonds, stir them into the cake, beat them in it, line buttered tin pans with white paper, put in the mixture an inch deep, and bake half an hour in quick oven, or forty minutes in a moderate oven

Lady-cake is usually made with the yolks of eggs, as Savoy-cake (two yolks for one whole egg) with the addition of pounded almonds. Ic it; when a little dry, mark it with a knife-blade in slices the width of a finger, and three inches long.

White Lady-Cake.—Beat the whites of eight eggs to a high froth, add gradually a pound of white sugar finely ground, beat quarter of a pound f butter to a cream, add a tea-cup of sweet milk, with a small teaspoonful of powdered volatile salts or saleratus dissolved in it; put the eggs to butter and milk, add as much sifted wheat flour as will make it as thick as pound-cake mixture, and a teaspoonful of orange-flower water or lemon extract, then add quarter of a pound of shelled almonds, blanched and beaten to a paste.

Buckwheat-Cakes.—To one quart of buckwheat flour add a teaspoonful of salt, and mix it with a large spoonful of yeast, and water sufficient to make a thick batter. Some put in a teacupful of fine Indian meal. Put it away for rising in a warm place a few hours. If mixed in the evening, it may remain in a cold place till morning. When it becomes sufficiently light for baking, place it on a griddle well buttered, and of a heat to cook them quick.

Country Cream-Cakes.—To a quart of flour add a teaspoon of fine salt and a piece of butter of the size of an egg; then take half a pint of thick cream, the better if a little sour; half a teaspoonful of pearlash, dissolved in water poured into the cream, and milk sufficient to wet the flour. If cream is abundant, it may be used without milk or pearlash. In this case, the cream may be sweet. When well kneaded, it is fit for baking.

Breakfast Indian Cakes.—Take one quart of buttermilk or sour milk; three eggs; butter in size eqnal to half a hen's egg; a little salt; one teaspoonful of saleratus; stirring in fine Indian flour till of a proper consistence; and then putting it into pans of an inch in depth, for a quick bake.

Nice Country Muffins for Tea.—One quart of milk; three eggs; half a teacupful of yeast; two large spoonfuls of sugar; butter equal in size to half a hen's egg; half a teaspoonful of saleratus, and a little salt; the whole well mixed and fermented, and then in rings quickly baked.

The Graham cakes and soda biscuits which follow are used at the Water Cure, Elmira, N. Y.

Graham Cake.—One quart of Graham flour; one tablespoon of butter, two teaspoons of cream of tartar; one teaspoon of soda; sufficient sweet milk to wet up; mix soft. If you like them sweetened, add a cup of sugar.

Soda Biscuits.—One cup of sugar; one tablespoon of butter; two teaspoons of cream of tartar; one teaspoon of soda; two eggs; one cup of sweet milk; stir about as stiff as cup-cakes.

Dough-Nuts with Sugar.—Make a dough of one pound of flour, a quarter of a pound of butter, three-quarters of a pound of brown sugar, rolled fine, one nutmeg, grated, one teaspoonful of ground cinnamon one tablespoonful of brewer's yeast, and warm milk enough to mix. Set it in a warm place to rise for one hour, or till light; then form in twists or squares, fry as before, and drain on a sieve

Crullers.—Cut up half a pound of butter into two pounds of sifted flour; add three-quarters of a pound of powdered sugar, a grated nutmeg, and a teaspoonful of powdered cinnamon, and mix them well together. Beat six eggs, and pour them into the mixture; add a tablespoonful of rose-water, and mix the whole into a dough. If the eggs and rose-water are not found sufficient to wet it, add a very little cold water. Mix the dough very well with a knife. Spread some flour on your paste-board; take the dough out of the pan and knead it very well; cut it into small pieces, and knead each separately; put all the pieces together, and knead the whole in one lump; roll it out into a large square sheet, about half an inch thick; take a jagging-iron, or a sharp knife, run it along the sheet, and cut the dough into long, narrow slips; twist them up in various forms; have ready an iron pan, with melted lard; lay the crullers lightly in it, and serve hot.

Frosting for Cake.—Powder very finely and sift half a teacupful of double-refined sugar, and two teaspoonfuls of Poland starch; beat the whites of two eggs to a stiff froth, so that you can turn the plate upside down, without the eggs falling from it; then stir in the sugar gradually; stir it ten or fifteen minutes without any cessation; then add a teaspoonful of lemon-juice; put in sufficient rose-water to flavor it. If you wish to color it pink, stir in a few grains of cochineal powder, or rose-pink; if to have it of a blue tinge, add a little of what is called the powder-blue. Lay the frosting on the cake with a knife soon after it is taken from the oven; smooth it over, and let it remain in a cool place till hard. This will be sufficient to frost one large cake.

Ginger-Snaps.—Half a pint of molasses, a quarter of a pound of brown sugar, caraway-seeds, and ground ginger, each a tablespoonful, and a quarter of a pound of butter; work the butter into a pound of flour, and then all together, and form it in cakes not larger than a dollar piece; bake in a moderate oven twenty minutes, when they will be dry and crisp.

Ginger-Nuts.—One cup of molasses, half a cup of sugar, a tablespoonful of ginger, one cup of butter, half a cup of sour milk, two teaspoonfuls of saleratus, dissolved in boiling water, and stirred in after the flour. Make it just stiff enough to roll very thin; cut in small cakes, and bake in a slow oven.

Tea-Cakes.—Melt one ounce and a half of butter in a little new milk; add a spoonful of yeast, and a little salt; mix it into a pound of flour; add an egg, and a spoonful of sugar. Knead it well until it leaves the hands; let it rise two or three hours; roll out, and stand an hour or less before the fire to rise, before baking in a moderate oven.

Another.—Rub a quarter of a pound of butter into a pound of flour; add a quarter of a pound of fine loaf-sugar, a few caraway-seeds, and two eggs. With a little warm milk let the whole be made into a paste, which, being covered with a cloth, is to stand before the fire nearly an hour. Then roll out the paste, cut it into round cakes with the top of a glass, and bake them upon floured tins.

Gingerbread.—Mix together three and a half pounds of flour, three-quarters of a pound of sugar, one pint of molasses, a quarter of a pound of ginger, and some ground orange-peel.

Another Kind.—Two pounds of flour, half a pound of butter, one pint of milk, one pint of molasses, one tablespoonful of saleratus, and ginger as you please.

Hard Gingerbread.—Three pounds of sugar, two pounds of butter, twelve eggs, two teacupfuls of milk, two teaspoonfuls of saleratus, eight tablespoonfuls of ginger, and flour sufficient to roll.

Soft Gingerbread.—Three eggs, three cupfuls of molasses, one cupful of butter, two teaspoonfuls of saleratus dissolved in a cupful of warm water, one tablespoonful of ginger, and six cupfuls of flour.

Another Kind.—Take six teacupfuls of flour, one cup of butter, or lard; work well together; add three cups of molasses, one cup of sour milk, one tablespoonful of saleratus, and two tablespoonfuls of ginger.

Nice Gingerbread.—Two pounds of flour, one and a quarter pounds of sugar, two tablespoonfuls of ginger, eight eggs, and one pound of butter. Rub the butter and sugar together till they are white, then break the eggs and strain them in; mix it well; put in the ginger, and sift in the flour; spread the cake thinly over tin pans or sheets. It will require a moderate heat; bake it twenty minutes.

Gingerbread with Fruit.—Four cups of flour, one of butter, one of sugar, one of molasses, one of milk, four eggs, three teaspoonfuls of ginger, a teaspoonful of cloves and nutmegs, half a pound of currants and raisins; add the fruit last, and bake in pans, in an oven, not very quick.

Sugar-Gingerbread.—Take two pounds of flour, one pound of butter, one pound of sugar, five eggs well beaten, two ounces of powdered ginger, and a teaspoonful of pearlash. Then mix and bake.

Gooseberry-Cake.—Press the juice out of some gooseberries, and strain it through some muslin: boil it up; strew in a pound of sugar to each pint of juice; stir well, and simmer till the sugar is melted; pour it into glasses; dry it in a stove till it will turn out, and then dry the cakes on plates.

Honey-Cake.—Three-quarters of a pound of honey, half a pound of fine loaf-sugar, a quarter of citron, a half-ounce of orange-peel cut small; of cinnamon and ginger each half an ounce, four well-beaten eggs, and a pound of sifted flour. Melt the sugar with the honey, and mix. Roll out the cakes, and cut in any form.

Indian Breakfast-Cakes.—Take one quart of buttermilk, or sour milk, three eggs, butter in size equal to half a hen's egg; a little salt, one teaspoonful of saleratus, stirring in fine Indian flour till of a proper consistence; and then putting it into pans of an inch in depth for a quick bake.

Crackers.—Rub six ounces of butter with two pounds of flour; dissolve a couple of teaspoonfuls of saleratus in a wine-glass of milk, and strain it on the flour; add a teacupful of salt, and milk enough to enable you to roll it out. Beat it with a rolling-pin for half an hour, pounding it out thin; cut it into cakes with a tumbler; bake them about fifteen minutes, and then take them from the oven. When the rest of your things are baked sufficiently take them out; set in the crackers, and let them remain till baked hard and crisp.

Butter-Crackers.—Rub four ounces of butter into a pound of flour;

when well mixed, put to it enough cold water to damp it and keep it together, and add a teaspoonful of salt; beat it with a rolling-pin until smooth; then roll it thin; cut it in small cakes, or make it in small crackers between your hands; bake on tins, in a quick oven, for fifteen minutes, or set them in a moderate oven for twenty minutes; let each cracker be about the size of a dollar piece, and nearly half an inch thick.

PIES.—Family Pie-Crust.—Work into a pound of sifted flour half a pound of sweet lard, or beef-dripping, with a dessert-spoonful of salt; when thoroughly mixed, put to it enough cold water to bind it together; flour the paste-slab, or table, and rolling-pin: take a part of the paste, and roll it to less than a quarter of an inch thickness.

For the upper or outside crust of a pie, roll the paste out thin; spread a bit of butter, half the size of an egg, over it; fold it up, roll it out again, and cover the pie.

Some are of the opinion that no under-crust should be made to apple or other fruit-pie. It is always heavy, and not fit to eat. Place a narrow rim of paste around the edge of the plate, and fill with the fruit, either raw or stewed, and cover it. The juices will be retained much better. and it will save flour and butter, which is no trifling consideration in these days; and, what is of more consequence, it saves dyspepsia, which costs more. After cutting, they are taken out with a spoon.

Mince-Pie.—The best kind of meat for mince-pies is neat's tongue and feet. Boil the meat till perfectly tender; then take it up; clear it from the bones and gristle; chop it fine enough to strain through a sieve; mix it with an equal weight of tart apples chopped very fine. If the meat is not fat, put in a little suet or melted butter. Moisten the whole with cider; sweeten it to the taste with sugar and very little molasses; add mace, cinnamon, cloves, and salt to the taste. If you wish to make your pies rich, put in wine or brandy to the taste, and raisins, citron, and Zante currants. The grated rind and juice of lemons improve the pie. Make the pies on shallow plates, with apertures in the upper-crust, and bake them from half to three-quarters of an hour, according to the heat of the oven.

Meat prepared for pies in the following manner will keep good several months, if kept in a cool, dry place: to a pound of finely-chopped meat, and a quarter of a pound of suet, put half an ounce of mace, one ounce of cinnamon, a quarter of an ounce of cloves, two teaspoonfuls of salt. Add, if you like, the following fruits: half a pound of seeded raisins, half a pound of Zante currants, a quarter of a pound of citron. Put in half a pint of French brandy or wine, three tablespoonfuls of molasses, and sugar sufficient to make it quite sweet. Put the whole in a stone pot, and cover it with a paper wet in brandy. When you wish to use any of it for pies, put to what meat you use an equal weight of apples pared and chopped fine. If not seasoned high enough, add more spice and sugar. If the apples are not tart, put in lemon-juice or sour cider.

Mince-Pies without Meat.—Take of currants, apples chopped fine, moist-sugar, and suet well-chopped, a pound of each, a quarter of a pound of raisins, stoned and chopped small, the juice of four Seville oranges, the juice of two lemons, the rind of one shred fine, nutmeg, and mace, to suit the palate, and a glass of brandy. Mix all together; put it in a pan, and keep it closely tied up.

Mince-Pies.—One pound of lean beef, boiled tender and chopped fine, one pound of beef-suet, a half-pound of apples chopped, two pounds of currants, one pound of raisins, seeded and chopped, a quarter of a pound of citron. Add sugar, salt, nutmeg, mace, cloves, wine, and brandy to vour taste.

Lemon Mince-Pies.—Take a large lemon; squeeze the juice from it, and boil the outside till it becomes soft enough to beat to a mash; put to it three large apples, four ounces of suet, the same of sugar, and half a pound of currants; add the juice of the lemon, and some candied fruit, the same as for other pies. Make a short crust, and fill the patty-pans in the usual way.

Lemon-Pies.—Pare two lemons; take out the seeds; chop the rind and pulps; add one egg, a small piece of butter, a small tea-cup of flour, three cups of sugar, two of water. Bake in a paste. This quantity will make two pies.

Apple Mince-Pies.—One pound of well washed and dried Zante currants, one pound of peeled and chopped apples, one pound of suet, chopped fine, one pound of moist sugar, a quarter of a pound of raisins, stoned and cut in two, the juice of four oranges and two lemons, with the chopped peel of one; add of ground mace and allspice each a teaspoonful, and a wine-glass of brandy; mix them well together, and keep it closely covered in a dry, cool place. Bake with two crusts, the same as mince-pies.

Cracker-Pies.—To three cups of water add two cups of sugar, two teaspoonfuls tartaric acid, five tablespoons of cracker rolled fine, flavor with lemon and season as apple-pie. This makes two pies. This also serves as a substitute for apple in mince-pies.

Pumpkin-Pie.—Stew the pumpkin in a covered vessel until soft enough to mash; then set a cullender or sieve into a basin, and press it through into the basin; when rubbed through, add to it milk enough to make a thin batter; to every quart of this batter put four well beaten eggs, a small tea-cup of sugar, and a salt-spoonful of salt; for each quart. grate in a nutmeg, and a teaspoonful of extract of lemon, and some ground ginger, if liked. Many prefer it without ginger.

Line flat-bottomed pie-dishes with pie-paste, and nearly fill them with the pumpkin mixture; lay a strip of paste around the edge; trim off the outside neatly, and bake three-quarters of an hour in a quick oven; the top of the pie should be delicately brown. Ornament to aste.

Squash-Pies.—Boil and sift the squash, and make them exactly like pumpkin-pies.

Carrot and sweet potato pies are made in the same way with crack ers; eggs or rice should always be used with them.

Apple-Pie.—Pare, quarter, and slice the apples, If not ripe, stew them in just water enough to prevent burning. When soft, sweeten and season to the taste. When ripe, they are better not to be stewed before baking. Fill the pie-plates; cover with a thick crust, and bake from half to three-quarters of an hour. When baked sufficiently, cut the upper crust through the center; remove it carefully with a broad knife; put a piece of butter, of the size of a walnut, into a pie; sweeten it to your taste, and if the apples are not tart enough, squeeze in the juice of part of a lemon; flavor the pie with either nutmeg, rose-water, or grated lemon-peel. Apples cut into quarters, without paring, and stewed soft in new cider and molasses, make good plain pies. The apples should be strained after stewing, and seasoned with cinnamon or nutmeg. If made quite sweet, it will keep good several months.

Dried Apple-Pie.—Stew the apples soft; turn them into a pan, and mash them fine; add half the peel of a lemon, cut fine, or a little grated nutmeg, a sprinkle of salt, molasses, or sugar, to make them quite sweet. Bake them in a rich paste, a little over half an hour. This will be quite as good as fresh fruit.

Currant and Gooseberry-Pie.—Currants and gooseberries are the best for pies when of full growth, just before they begin to turn; they are tolerably good when ripe. Currants, mixed with ripe raspberries or mulberries, make very nice pies. Green currants and gooseberries for pies are not sweet enough, without the sugar is scalded in before they are baked, as the juice of the currants is apt to run out while they are baking, and leave the fruit dry. Stew them on a moderate fire, with a tea-cup of water to a couple of quarts of currants; as soon as they begin to break, add the sugar, and let it scald a few minutes. When baked without stewing, put to each layer of fruit a thick layer of sugar. There should be as much as a quarter of a pound of sugar to a pint of currants, to make them sufficiently sweet. Green-currant pies are good, sweetened with molasses and sugar mixed.

Cranberry-Pie or Tarts.—Pick a quart of cranberries, free from imperfections; put a pint of water to them, and put them in a stew-pan, over a moderate fire; put a pound of clean brown sugar to them, and stew them gently until they are all soft; mash them with a silver spoon, and turn them into a dish, to become cold; then make them into pies or tarts, and bake. Many persons put flour in cranberry pies; it is a great mistake, as it completely spoils the color of the fruit.

Rhubarb-Pie.—Cut the large stalks off where the leaves commence; strip off the outside skin; then cut the stalk in pieces half an inch long; line a pie-dish with paste, rolled rather thicker than a dollar piece; put in a layer of the rhubarb, nearly an inch deep; to a quart bowl of cut rhubarb, put a large tea-cup of sugar; strew it over with a saltspoonful of salt, and half a nutmeg, grated; cover with a rich pie-crust; cut a slit in the center; trim off the edge with a sharp knife, and bake in a quick oven until the pie loosens from the dish.

Apricot-Pie.—Take eighteen fine apricots; cut them in halves, and take out the stones; place them in a dish lined with puff-paste; add four ounces of powdered sugar, and four ounces of butter, lukewarm; then put on the upper crust; glaze with the white of egg, and sprinkle sifted sugar all over, and bake in a moderate oven.

Red Sugar-Beet Pie.—Pies made of the red sugar-beet are said to be delicious, somewhat resembling rhubarb-pie in flavor, though more rich and substantial. It is seasoned with vinegar, sugar, and spices, to suit the palate. The root may be used without boiling, being chopped fine. Prepare the crust, and bake as you would a green-apple pie.

Cocoanut-Pie.—Grate the white part, and mix with milk; let it boil slowly eight or ten minutes. To a pint and a half of cocoanut add a quart of milk, four eggs, half a cup of sweet cream, two spoonfuls of melted butter, a cracker, rolled fine, and half a nutmeg. The cocoanut should cool before the eggs and sugar are stewed in. Bake in a deep plate, in a quick oven.

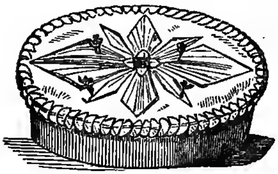
Huckleberry or Whortleberry Pie.—Clean a quart of berries in water; line a buttered pie-dish with a pie-paste; put in the berries half an inch deep; to a quart of berries put a tea-cup of brown sugar and half a tea-cup of water; dredge a teaspoonful of flour over; strew a saltspoonful of salt and half a nutmeg, grated, over; cover the pie; cut a slit in the center, or make several small incisions on either side of it; trim it off neatly with a sharp knife, and bake it in a quick oven for three-quarters of an hour.

Plain Custard-Pie.—Boil a quart of milk with half a dozen peach-leaves, or the rind of a lemon. When they have flavored the milk, strain it, and set it where it will boil. Mix a tablespoonful of flour, smoothly, with a couple of tablespoonfuls of milk, and stir it into the boiling milk. Let it boil a minute, stirring it constantly; take it from the fire, and, when cool, put in three beaten eggs; sweeten it to the taste; turn it into deep pie-plates, and bake the pies directly in a quick oven.

Cherry-Pie.—Stone your cherries, that you may be sure they are free from worms; lay your paste in a deep dish, and add a good quantity of fruit; fill the dish with molasses, with a handful of flour sprinkled over, then a nice paste, and bake more than half an hour. If sugar is used, you will need water and flour. This makes the gravy very rich, and the pie delightful.

Lemon-Pie.—Boil six fresh lemons in water until a straw will penetrate the skin; then take them out, chop them fine, and take out the seeds; to a pound of light-brown sugar put a tea-cup of water; let it boil, skimming it clear until it is a nice syrup; then put in the lemon, and set it to cool; cover a shallow plate with pie-paste, put in the lemon, spread out to nearly the edge, cover with a paste, cut a slit in the center, and bake.

Veal or Chicken and Parsley Pie.—Cut some slices from the leg or neck of veal; if the leg, from about the knuckle. Season them with salt; scald some picked parsley, and squeeze it dry; chop it a little, and lay it at the bottom of the dish; then put the meat, etc., in layers; fill the dish with new milk, but not so high as to touch the crust; cover it, and, when baked, pour out a little of the milk, and put in half a pint of good scalded cream. Chicken may be cut up, skinned, and made the same way.



PUDDINGS.—*Directions for Puddings.*—Puddings should be boiled in tin forms, rubbed over on the inside with butter; or in muslin bags, which should be dipped into boiling water, and then be rubbed over on the inside with flour. A small pail will answer, with a cloth tied over it. If boiled in a tin form, do not let the water reach the top of it. If in a bag, it must be turned frequently.

Baked Apple-Pudding.—Twelve large apples, stewed very dry, a quarter of a pound of butter, stirred in when the apples are nearly cold, sugar to your taste, one wine-glass of wine and rose-water, a little cinnamon and nutmeg, seven eggs, two handfuls of bread, crumbed very fine. Bake twenty minutes. Serve with sauce, or sugar and cream.

Boiled Apple-Pudding.—Make a batter with two well-beaten eggs and a pint and a half of milk, with a pint of wheat flour; beat until smooth and light; pare, quarter, and core five or six large, tender, tart apples, and stir them into the batter with a teaspoonful of salt; tie it in a pudding-bag, and boil for two hours; serve with sugar, butter, and nutmeg sauce. Other fruits, as huckleberries and cranberries may be treated in the same way.

Plain Boiled Indian Pudding.—Pour three pints of boiling milk to a quart of Indian meal, stir it well, add a tea-cup of molasses, a little salt, and two tablespoonfuls of flour. Boil four hours.

Corn-Meal Pudding.—Let two quarts of water come to a boil; then add a tablespoonful of salt; take off the light scum from the top; have sweet, fresh yellow or white corn meal; stir it in gradually and thoroughly until it is as thick as you can stir easily, or until the stick will stand in it; stir it a while longer; let the fire be gentle; when it is done enough, it will bubble or puff up; turn it into a deep basin; this is eaten cold or hot, with milk or with butter, and syrup or sugar, or with meat and gravy, the same as potatoes or rice. When cold, it may be cut into slices and fried.

Eve's Pudding.—Six eggs, six large apples, pared and chopped, six ounces of bread, crumbed fine, six ounces of currants, six ounces of sugar. Three hours will boil it.

Plum-Pudding.—Half a pound of raisins, half a pound of currants, half a pound of bread grated, half a pound of apples chopped, four eggs, half a nutmeg, a wine-glass of brandy, a quarter of a pound of suet. Boil three hours.

English Plum-Pudding.—One pound of flour, one pound of suet, one and a half pound of currants, one pound of sugar, ten eggs, two spoonfuls of milk, two nutmegs, one gill of brandy and wine mixed, citron. Boil six hours. This quantity will make two puddings in quart bowls.

Custard-Pudding—Baked.—One pint of milk, eight eggs, two spoonfuls of flour, two of rose-water, half a nutmeg, a little salt, and sugar to the taste. Bake half an hour.

Plain-Baked Bread-Pudding.—Pound rusked bread fine; to five heaping tablespoonfuls of it put a quart of milk, three beaten eggs, three tablespoonfuls of rolled sugar, a teaspoonful of salt, half a nutmeg, and three tablespoonfuls of melted butter. Bake it about an hour. It does not need any sauce.

Economical Pudding.—Keep your pieces of bread and dry them nicely; when enough are collected, soak them in milk overnight; in the morning drain out all the milk you can through a cullender; add to the oread some sugar, and a little salt, with some scalded raisins; tie it in a bag, and boil five or six hours. Serve with sweet sauce.

Carrot-Pudding.—Take a large carrot; boil it soft; bruise it in a marble mortar, and mix with it a spoonful of biscuit-powder, four yolks and two whites of eggs, a pint of cream, a large spoonful of rose or orange-flower water, a quarter of a nutmeg, two ounces of sugar; bake it in a shallow dish; turn it out, and serve with sugar over.

Custard-Pudding—Boiled.—Take a pint of cream, six eggs, well beaten, two spoonfuls of flour, half a nutmeg, grated, and salt and sugar to taste; mix them together; butter a cloth, and pour in the batter; tie it up; put it in a sauce-pan of boiling water, and boil it an hour and a half. Serve with melted butter.

Jenny Lind Pudding.—One cup of sugar; one egg; one spoonful of butter; one cup of sweet milk; one pint of flour; two and a half teaspoonfuls of baking-powder. Bake three-quarters of an hour; serve with sauce.

Potato-Pudding.—Take two pounds of potatoes, wash, boil, and mash them; when cold, add a pint of new milk, three eggs, well beaten, two ounces of moist sugar, and a little nutmeg. Bake it.

Puddings in Haste.—To grated bread add suet-shred, a few currants, the yolks of four eggs and the whites of two, some grated lemon-peel, and ginger; mix and form it into balls, about the size and shape of an egg, with a little flour. Put them into boiling water, and boil them for twenty minutes.

Delicate Rice-Pudding.—Boil half a pound of rice in three pints of milk, until the milk is absorbed by the rice; turn it out of the sauce-pan, and when cold, add to it three well-beaten eggs, with a little nutmeg and sugar; put it into a buttered basin, and boil an hour. This, made in smaller proportions, is a light and pleasant pudding for an invalid. A bit of cinnamon may be boiled with the milk and rice.

Suet-Pudding.—Chop half a pound of beef-suet extremely fine; add the same quantity of flour, two eggs, well beaten, a small quantity of pounded and sifted sugar, and a little salt; mix well together with milk to a tolerable consistency, and either bake or boil it.

Minute-Pudding.—Put a pint and a half of milk on the fire. Mix five large tablespoonfuls of either wheat or rye flour, smoothly, with half a pint of milk, a teaspoonful of salt, and half of a grated nutmeg. When the milk boils, stir in the mixed flour and milk. Let the whole boil for one minute, stirring it constantly; take it from the fire; let it get luke-warm; then add three beaten eggs. Set it back on the fire, and stir it constantly until it thickens. Take it from the fire as soon as it boils; serve with sauce.

Corn-Pudding.—Grate sweet green corn; to three tea-cups of it, when grated, put two quarts of milk, eight eggs, a teaspoonful of salt, half a tea-cup of melted butter, and a grated nutmeg. Bake the pudding an hour; serve it up with sauce.

Cracker-Pudding.—Mix ten ounces of finely-pounded crackers with a wine-glass of wine, a little salt, and half a nutmeg, three or four table-spoonfuls of sugar, and two of melted butter. Beat eight eggs to a froth; mix them with three pints of milk, and turn them on the rest of the ingredients. Let it remain till the crackers become soft; then bake it.

Apples in Batter.—Pare and core several small-sized apples; set them in a deep dish; make a rich batter, and pour it over them; bake in a quick oven for one hour; serve with wine sauce.

Baked Indian-Pudding.—Seven tablespoonfuls of meal, one of flour; wet with a quart of milk; thicken it over the fire like mush; take it from the fire, and add a tea-cup of molasses, a little salt, and bake three-quarters of an hour.

Boiling-Mush.—It is very common to make mush by boiling only a few minutes. This is all wrong. It should be boiled one or two hours, and if longer, will do no harm. It will be necessary to occasionally add some hot water, to keep the mass thin, and prevent burning; and it must be often stirred.

Boiled Indian-Pudding.—Boil a quart of milk, and stir in Indian meal till it is nearly as thick as you can stir it with a spoon; then add a teaspoonful of salt, a cupful of molasses, a teaspoonful of ginger or ground cinnamon, and cold milk enough to make a thin batter; boil in a thick bag four hours. Care should be taken that the water does not stop boiling while the pudding is in. A dish made in this way, with the addition of a quart of chopped sweet apples, and baked from four to six hours, will be found delicious when served up hot, and eaten with sauce made of drawn-butter, nutmeg, and wine.

Curd.—To a quart of milk put a large tablespoonful of rennet-wine; let it stand till it turns; then set it on the ice till wanted. Serve with sugar and cream, and sweetmeats, if you choose.

Floating-Island.—Beat the whites of six eggs, and a tablespoonful of white powdered sugar, the same of currant-jelly, to a stiff froth. Put a pint of cream into a deep dish, and pile the froth on lightly. It should not stand long.

Yeast-Dumplings.—Make a dough with a tablespoonful of yeast, a little salt, and warm milk, and flour; set it to rise. When light, flour your hands, and make it in balls the size of a common apple; throw them into boiling water, and cover close. In half an hour take them up with a skimmer; serve plain, with butter or with a sweet sauce.

Lemon-Dumplings.—The juice of a lemon and the rind, chopped very fine; two eggs; a quarter of a pound of beef-suet; a quarter of a pound of loaf-sugar; a quarter of a pound of bread, grated. To be boiled twenty minutes, in a cloth.

Light Dough-Dumplings.—Take a pound of dough; make it into small balls, the size of eggs; boil in plenty of water, and use it for roast o boiled meats, or serve with butter and sugar, or with gravy.

TARTS.—Tartlets.—Cut your paste, after rolling it thin, with a fluted cutter as large as your tartlet-pan may be round; place each piece even into the pan; press it down with your finger; then put into each, either a piece of square crust of bread cut into dice in the middle of each, or a very little piece of jam; you will have to add more after they are baked; sift some fine sugar over them; bake them a light color.

Apple-Tart.—Use good tart apples. Peel, slice, and stew them with a tea-cup each of water and sugar to a quart of sliced apples; add half a nutmeg, grated, a saltspoonful of salt, and a little grated lemon-peel, or lemon extract, or half a teaspoonful of ground cinnamon; set them to become cold; line small pie-plates with rich pie or light puff-paste; put in the stewed apples half an inch deep; roll out some of the paste; wet it over slightly with the yolk of an egg, beaten with a little milk, and a teaspoonful of sugar; cut in strips the width of a finger, and lay it in bars or diamonds across the tart; lay another strip around the edge, trim off the outside neatly with a sharp knife, and bake it in a quick oven until the paste loosens from the dish. Tarts may be made of other fruits and sweetmeats in a similar manner.

Bird's-Nest Pudding.—Pare and core six or eight good tart apples, so as to leave them whole, and place them in a pudding-dish. Take a quart of milk, nine eggs, and sufficient flour to make a thin batter; pour it on, and cover the apples; bake it in an oven till it is done, and eat with butter and sugar or sauce.

Another.—Take some good baking apples, pare, core, and cut them into small pieces; place them in a dish lined with puff-paste; strew over pounded sugar, cinnamon, mace, nutmeg, cloves, and lemon-peel chopped small; then add a layer of apples, then spice, and so on till the dish is full; pour a glass and a half of white wine over the whole; cover with puff-paste, and bake it. When done, raise the crust, stir in two ounces of fresh butter, and two eggs well beaten; replace the crust, and serve either hot or cold.

Apricot-Tart.—Take some apricots, cut them in two and break the stones; put them into paste with sugar, a small quantity of preserved lemon, and a few of the kernels; close it, sprinkle sugar over and glaze it. If the apricots are not ripe, boil them a short time in water, and drain them well.

Apricot Sweetmeat for Tarts.—Take a pound of ripe apricots, remove the stones, break them, and blanch the kernels; add one pound and a half of green gages, and one pound and a quarter of lump-sugar; simmer it until the fruit becomes a jam. It must not boil, and must be kept well skimmed; clarified sugar will be found the best to use for this preserve.

Cherry-Tart.—Line the sides of a dish with good crust; strew in sugar; fill it with picked cherries, and put sugar at the top; red currants may be added, if liked; cover with crust, and bake.

Currant-Tart.—Line a dish with puff-paste; strew powdered sugar over the bottom of it; then put in alternate layers of currants carefully picked, and sugar, till the dish is full; then cover and bake it.

The addition of raspberries or mulberries to currant-tart is a great mprovement.

Damson-Tart.—Line a dish with a good crust; put in the fruit, and proceed the same as for any other fruit-pie.

Grape-Tart.—Take the youngest grapes before stones are formed; pick and scald them the same as currants or gooseberries, and finish the same as other tarts. More sugar will be required than usual, on account of the extreme tartness of the fruit.

Gooseberry (Green) Tart.—Use either whole gooseberries, or make a marmalade of them with a good syrup; the last method is perhaps the best, as you can tell easily how sweet they are and ought to be; if made of marmalade, the seeds ought to be taken out.

Pear-Tart.—Peel some pears carefully; cut them into quarters, and remove the cores; if large and green, boil them soft in a little water, simmering them in some rich syrup, and place them with the syrup in a dish lined with puff-paste; cover and bake it.

Quince-Tart.—Take a few preserved quinces, put an equal weight of syrup, made with sugar and water and preserve, into a preserving-pan; boil, skim, and then put in the fruit; when somewhat clear, place the quinces in a tart-dish, with puff-paste as usual. Cover, bake it, and when done, lift the top gently, put in the syrup, and serve.

The observance of the following will save any family, in a few years, ten times the price of this work:

To Neutralize the Acid in Fruit Pies and Puddings.—A large quantity of the free acid which exists in rhubarb, gooseberry, currants, and other fruits, may be judiciously corrected by the use of a small quantity of carbonate of soda, without the least affecting their flavor, so long as too much soda is not used. To an ordinary-sized pie or pudding, as much soda may be added as, piled up, will cover a shilling, or even twice such a quantity if the fruit is very sour. If this little hint is attended to, many a stomach-ache will be prevented, and a vast quantity of sugar saved, because, when the acid is neutralized by the soda, it will not require so much sugar to render the tart sweet.

JELLIES.—Clear Apple-Jelly.—Pare and core some pippins; put them into a pan, with as much water as will cover them; let them boil gently until soft; let them get cold; then strain them through a jelly-bag; put the juice into your preserving-pan, and to each pint of juice put one pound of fine sugar and the peel of two lemons; then boil it until it is reduced to the stiffness of calves'-foot jelly; skim it well, and add the juice of a lemon; it should be made in September—the flavor of the apple is better; if you cannot get the pippin, any acid apple will do.

Apple-Jelly.—Pare and core some tart apples; boil till soft in plenty of water, and strain through a jelly-bag. Do not squeeze them. Add a pound of white sugar to each pint of liquor, and boil slowly to a thick jelly. A little cranberry or beet juice put in on removing from the fire, will give it a red tinge; or use saffron tincture, or spinach leaves, to color, if preferred. Strain again, and when cool, put into glasses and cover.

Quince-Jelly.—This may be made in much the same manner as apple-jelly. Add the white of eggs; clarify it, and put it into glasses.

Apricot-Jelly.—Take eighteen fine apricots; let them be of a nice red color; stone them, and cut them in pieces into some syrup, usually made with twelve ounces of sugar; but for apricot-jelly it should be rather more liquid than for other jellies; when the fruit is done, put it into a napkin to express all the juice you possibly can, which you must add to the syrup in which the apricots have been done, and which has been previously strained through a silk sieve; and, after having mixed with it a proper quantity of isinglass, to thicken it, finish the same as all other jellies.

Lemon-Jelly.—To a pint of water put an ounce of white isinglass, pulled into shreds and rinsed, and the rinds of six lemons. Stir till dissolved, and then add a pint of lemon-juice, and sweeten with white sugar. Boil four or five minutes; color with tincture of saffron; strain and fill glasses when nearly cool.

Strawberry Raspberry, and Blackberry Jelly.—Take the berries when ripe; mash them, and let them drain through a flannel bag without squeezing it. To each pint of juice put a pound of white sugar, and the beaten white of an egg to three pounds of the sugar. Set it on the fire; when it boils up well, take it from the fire, and skim it clear. Set it back on the fire; if any more scum rises, take it from the fire and skim it off. Boil it till it becomes a jelly, which is ascertained by taking a little of it up into a tumbler of cold water. If it falls to the bottom in a solid mass, it is sufficiently boiled. Seal it up in tumblers or cups.

Cranberry, Grape, and Currant Jelly.—They are all made in the same manner. Take the fruit in its prime; wash, and drain it till nearly dry; then put it in an earthen jar or pot, and set the pot in a kettle of hot water to boil, taking care that none of it gets into the jar. When the fruit breaks, turn it into a flannel bag, and let it drain slowly through into a deep dish without squeezing. When the juice has all passed through the bag, put to each pint of it a pound and a half of white sugar. Put to each quart of the syrup the beaten white of an egg. Set the syrup where it will boil gently; as fast as any scum rises, take the syrup from the fire and skim it clear. Boil fifteen or twenty minutes, and then try it in cold water; if it sinks, it is done. Pour into tumblers, sealing them over with white paper smeared with the white of egg (which will make the paper stick to the glass), and place them in the sun till made.

Currant-Jelly.—Having stripped off the stems, put the fruit into a stone jar; set it into a kettle of boiling water until the juice runs freely; then strain it through a flannel; to every pint of juice add a pound of loaf-sugar; let it stand till dissolved; put it in a preserving-kettle, and boil it twenty minutes; skim it; put it in small glasses, and when cold, paste paper over them.

CUSTARDS.—Apple-Custard.—Select good sweet apples, such as will cook well; pare, cut, and stew them; when thoroughly done, stir them briskly till the pieces are all broken fine. Allow the apples time to cool, and thin down to the proper consistency with good milk, and bake with one crust, as you would bake a common custard, or a pump kin-pie. If a richer pie is wanted, a few eggs may be added. If the apples are totally sweet, but little sugar or other sweetening will be required. If desirable, spices may be added.

Another Kind.—Pare, core, and slice twelve pippins. Boil a pint of water, a pound of loaf-sugar, and twelve cloves, and skim. Put in the apples, and stew until the liquid is nearly gone. Lay them in a deep dish; take out the cloves when they are cold; pour in a quart of custard, and let it cook by setting the dish in boiling water until it sets. The same with quince, but more sugar.

Boiled Custards.—Scald a quart of milk; when cool, pour it into a mixture of nine beaten eggs, nine tablespoonfuls of sugar, and rose-water to your taste; strain this through a sieve into your custard-cups; set the cups into a deep iron pan; fill it half full of water, and boil them hard.

Soft Custards.—Scald a quart of milk, with mace, cinnamon, and lemon-peel; pour into this sixteen well-beaten eggs, leaving out the whites of eight, and half a pound of sugar; strain this through a sieve into a pitcher, and set it into a kettle of hot water, stirring it constantly until boiled enough.

Custard, Baked.—Boil a pint of cream, with mace and cinnamon; when cold, take four eggs, a little rose and orange-flower water, a little white-wine, nutmeg, and sugar to your taste; mix them well together, and bake them in china cups.

Custard, Plain.—Boil together a quart of cream or new milk, a stick of cinnamon, and some mace; then take twelve eggs, beat them up well; sweeten them; put them into a pan, and bake or boil them, stirring them all one way till they are of a proper thickness; boil the spice first, and when the milk is cold, mix the eggs, and boil it. The spice may be left out, and in lieu of that, four or five bitter almonds—to the taste.

EGGS AND OMELETS.—For making omelets, or frying eggs, it is best to have an omelet-pan which is thick-bottomed and about six inches in diameter; this is the best also for pancakes, fritters, or for frying oysters. For turning omelets, fried oysters, fried parsley, etc, use a skimmer.

Boiled-Eggs.—Wash them; put them into boiling water in their shells; keep the water boiling—three minutes for very soft—five, that the yolk only may be soft; six minutes will boil the yolk hard, for eating. Eight minutes are required for boiling eggs for salad or garnish. When done, take them from the boiling water into a basin of cold water, which will prevent the yolk turning dark or black.

Another way, which is very nice, is to break the shells and drop the eggs into a pan of scalding-hot water; let it stand till the white has set; then put the pan on a moderate fire; when the water boils up, the eggs are cooked sufficiently. Eggs look very prettily cooked in this way, the yolk being just visible through the white.

Poached-Eggs.—Break the eggs into a pan; beat them to a froth; then put them into a buttered tin pan; set the pan on a few coals; put in a small lump of butter, and a little salt; let them cook very slowly, stirring them constantly till they become quite thick; then turn them on to buttered toast.

To Dress Eggs.—Break your eggs separately in cups; have ready a large stew-pan half full of water; let it simmer; then put in your eggs, not too many at a time; some like them done less than others; therefore boil them accordingly; have ready by your side a dish of warm water, and when your eggs are sufficiently done, put them into this clean water; trim them smooth and round; dish them on pieces of toast buttered; if for dinner, upon prepared spinach or potatoes.

Scotch-Eggs.—Boil hard six eggs; take off the shells; then mask each egg with some raw forcemeat, rolling each egg in some grated tongue or ham; press this with your hands close to the eggs; roll each egg in some very fine bread crumbs; fry them to a fine yellow color; put in your dish a sharp sauce or plain gravy, or dry upon a napkin, and fried parsley.

Omelet.—Take as many eggs as you think proper, according to the size of your omelet; break them into a basin, with some chopped parsley and salt; then beat them well, and season them according to taste; have ready some onions chopped small; put some butter into a frying-pan, and when it is hot, but not to burn, put in your chopped onions; give them two or three turns: add your eggs to it, and fry the whole to a nice brown; you must only fry one side, when done, turn it into a dish, the fried side uppermost, and serve.

Omelet au Naturel.—Break eight or ten eggs into a pan; add pepper, salt, and a spoonful of cold water; beat them up with a whisk; in the mean time, put some fresh butter into a frying-pan; when it is quite melted and nearly boiling, put in the eggs with a skimmer. As it is frying, take up the edges, that they may be properly done; when cooked, double it. Serve very hot.

Onion-Omelet.—Cut some very white onions into slices; give them a few turns over the fire; when nearly done, moisten them with cream, and season with salt, pepper, and nutmeg; mix this with half a dozen eggs; beat the whole up well, and fry the omelet either in oil or butter.

Omelet with Ham, etc.—Beat the eggs to a froth, and to a dozen of eggs put three ounces of finely-minced boiled ham, beef, or veal; if the latter meat is used, add a little salt. Melt a quarter of a pound of butter; mix a little of it with the eggs; it should be just lukewarm; set the remainder of the butter on the fire in a frying or tin pan; when quite hot, turn in the eggs, beaten to a froth; stir them until they begin to set. When brown on the under side, it is sufficiently cooked. The omelet should be cooked on a moderate fire, and in a pan small enough to have the omelet an inch thick. When you take them up, lay a flat dish on them; then turn the pan upside down.

Omelet-Fritters.—Make two or three thin omelets; cut them into small pieces, and roll them into the shape of olives; when cold, dip them into batter, or enclose them into puff-paste; fry, and serve them with fried parsley.

Omelet-Souffle.—Break six eggs; separate the whites from the yolks; to the latter put four dessert-spoonfuls of powdered sugar, and the rind of a lemon, chopped exceedingly small; mix them well; whip the whites, as if for biscuits, and add them to the rest; put a quarter of a pound of butter into a frying-pan over a slow fire.

PRESERVED FRUITS, etc.—A very common discovery made by those who preserve fruits, etc., for family use, and are not sufficiently versed in the art of confectionery, is, that the preserve either ferments, grows mouldy, or becomes candied.

These three effects arise from three separate causes. The first, from insufficient boiling; the second, from being kept in a damp place, assisted, in some degree, by the first cause; and the third, from too quick and too long boiling.

Preserves of all kinds should be kept entirely secluded from the air, and in a dry place. In ranging them on the shelves of a store-closet, they should not be suffered to come in contact with the wall. Moisture in winter and spring exudes from some of the dryest walls, and preserves invariably imbibe it. To prevent all risks, it is always as well to lay a brandy paper over the fruit before tying down. This may be renewed in the spring. They should be looked to frequently to see that they do not ferment. Whenever they do, the syrup should be turned from them, scalded, and turned back on them while hot.

A pound of sugar to a pound of fruit, is sufficient to preserve most kinds of fruit. Some kinds require more and some less, than an equal weight of sugar. White sugar makes the most delicate sweetmeats—nice brown sugar answers very well for most kinds of fruit. The West India sugar-house syrup is better than sugar to preserve fruit, on account of its never fermenting. When sugar is used, clarify it, and put in the fruit. The skimmer should never be left in the preserving-pan after the sugar is clarified, nor after the scum is removed.

In boiling, the sugar is continually rising and falling, and on falling, leaves marks on the side of the pan, which the heat of the fire would soon burn, and thereby spoil the whole of the sugar. To avoid this, have by the side of you a pan of cold water, and a cloth or sponge, upon which wipe the sides of the pan carefully the instant after the sugar has fallen.

All kinds of fire-proof ware will do to preserve in, excepting iron ware. The fruit should not be crowded while preserving, and should boil gently. The fruit should be turned out of the preserving-kettles as soon as done, and set away. Keep the sweetmeats in stone or China jars, that have never been used for other purposes. Glass jars are the best for delicate sweetmeats, such as strawberries or cherries. Preserves should be covered tight, and kept in a cool place.

Fruit may be dried in a stove-oven or in the sun—if in the sun, cover with glass to keep off insects; if in oven, it must be of gentle warmth.

To Clarify Sugar.—Take the quantity of fine white loaf-sugar you intend to clarify, add to it of very clean warm water half a pint for every pound; when dissolved, add to it the white of one or two eggs—as the quantity may require—well whipped, put it on the fire, and when it comes to a boil, pour into it an ordinary teacupful of cold water; on its rising again to a boil, remove it, and let it settle twenty minutes; skim the scum from the top, pour off the syrup into a clean vessel with sufficient quickness to leave all the sediment at the bottom, and such steadiness as to prevent any of the latter rising and mixing with it.

Strawberries Preserved Whole.—Take equal weights of the fruit and double-refined sugar; lay the former in a large dish, and sprinkle half the sugar in fine powder over; give a gentle shake to the dish, that the sugar may touch the under side of the fruit; next day make a thin syrup with the remainder of the sugar, and instead of water, allow one pint of red-currant juice to every pound of strawberries; in this simmer them until sufficiently jellied; choose the largest scarlets or others, when not dead ripe; they eat well served in thin cream in glasses.

Pears, Preserved.—These may be preserved whole, pared with the stems on, or in halves, cored. Make a thin syrup, and boil them tender. If boiled too fast, they will break. They will be sufficiently cooked in half an hour. If you wish them nice, let them lie in the syrup, in a jar or tureen, two days. Drain the syrup from the pears; add more sugar; boil ten minutes; skim, and put in the pears; simmer them till they are transparent; take them out; stick a clove in the end of each, and lay them in a jar when cool; then pour over the warm syrup. For common nse, they are best done in quarters, boiled tender in a little water; then add half a pound of sugar to a pound of pears to the liquor, and simmer them gently half an hour. They may be flavored with lemon, if preferred.

Peaches, Preserved.—If preserved whole, they should be gathered before they are fully ripe, and before they part from the stone. Pare them, and boil in the syrup gently, until they are tender. If in quarters, crack the pits of half the peaches, and boil in the syrup; strain, and cook in the usual way. Put up in jars and glasses. Some prefer them cooked in a little water, and the syrup poured over them hot.

If you wish them preserved in brandy, they should be gathered before they are ripe, rubbed with flannel, pricked with a large needle to the pit, in several places, and run the needle down the seam. Put them in cold water, and boil them very gently until tender. Take them carefully out, and fold them in a table-cloth or soft flannel. Have ready a pint of brandy, a pint of the juice in which they were boiled, and a pound of loaf-sugar. When the peaches are cool, lay them in a jar, and pour over them. They may be used as a dessert.

Plums, Candied.—Choose your fruit of a nice shape, and good size; cut them in halves; lay them on a large shallow dish; strew powdered sugar over them, and put them in a moderate oven, tightly closed; in half an hour's time take them out, and place the plums, one by one, on glass plates, to dry.

Plums, Preserved.—May be preserved nice with the skins on or off. If on, they should be pricked at the top and bottom with a large needle. If you take them off, first turn boiling water over them. Plums require a pound and a half of sugar to a pound of fruit. Prepare your syrup thick, and lay in your plums to simmer, not to boil; let them remain in a scalding state until cooked through—at least two hours. Then skim out, and boil the liquor down about an hour. It must be thick, to keep well. The flavor will be much improved, by boiling in the syrup half a pint of the kernels, cracked. They must be strained out. Plums may be hardened by scalding them in alum-water; and when drained, pour the hot syrup over them every day for a week; but if done with care, they will remain whole, preserved as above.

Quinces, Preserved.—Choose the quinces very ripe, yellow, and quite sound; pare, quarter, and core them; put them into a little water, and scald; as soon as they are soft, throw into cold water, and put them to drain; clarify and boil an equal weight of sugar; put in the fruit, cover, and leave them to simmer for another quarter of an hour; then take them from the fire; skim, and pour the preserves into a pan. In two days, drain off the syrup; boil it; add the fruit; give the whole one boil, covered; let it cool a little, and then simmer for a quarter of an hour; after which leave it till next day, when proceed as above, but boil the syrup. As soon as the preserve is cooled, put it into pots, adding to each a little quince jelly.

Rhubarb, Preserved.—Rhubarb preserve, if made according to the following directions, is almost equal to the celebrated Scotch marmalade: procure six oranges, peel, and take away the white rind and the seeds; slice the pulp into the stew-pan, along with the peel; cut very small; add a quart of rhubarb, cut fine, and from one pound to one pound and a half of loaf-sugar; boil the whole down, as for other preserves.

Raspberry-Jam.—To every pound of fruit use a pound of sugar, but always boil the fruit well before you add the sugar to it—it will be a better color; put your fruit in your preserving-pan, mashing them with a long wooden spoon; after boiling them a few minutes, add the same quantity of sugar as fruit, boiling it for half an hour, keeping it well stirred. When sufficiently reduced, fill your jars.

Tomato-Figs.—Pour boiling water over the tomatoes to remove the skins; weigh them, and put them into a stone jar, with as much sugar as tomatoes; let them stand two days; pour off the syrup; and boil and skim till no scum rises; then pour it over the tomatoes, and let them stand two days, as before; boil and skim again. After a third boiling and skimming, let them stand in their syrup until drying weather; then place them on earthen plates or dishes, and put them in the sun to dry—that takes about a week; then pack them in small wooden boxes, with fine white sugar between each layer They will keep for years. Figs made of tomatoes are really better than those make of true figs.

Gooseberry-Jam.—Take what quantity you please of ripe gooseberries, and half their quantity of lump-sugar, break them well and boil them together for half an hour or more, if necessary; put them into pots, and cover with paper.

Peach-Jam.—Take the fruit when ripe, peel and stone them, put them into the pan, and mash them over the fire till hot; rub them through a sieve, and to each pound of pulp add a pound of white sugar, and half an ounce of bitter almonds, blanched and pounded; let it boil ten or fifteen minutes, and stir and skim it well.

Cherry-Jam.—Having stoned and boiled three pounds of fine cherries, bruise them, and let the juice run from them; then boil together half a pound of red-currant juice, and half a pound of loaf-sugar; put the cherries into these whilst they are boiling, and strew on them three-quarters of a pound of sifted sugar; boil all together very fast for half an hour, and then put into pots; when cold, put on brandy papers.

Quinces for the Table.—We know, from personal observation, that few persons are acquainted with the best method of preparing quinces, for the table; it is simply this: bake them, remove the skin, slice, and serve with cream and sugar. Prepared in this manner, many prefer them to the peach. If you have never eaten them prepared in this way, try it, by all means, and you will thank us for the suggestion.

To Preserve Peaches.—First weigh your peaches, then dip them in weak boiling lye, without being peeled; take them out and rub them gently with a coarse towel; be very careful not to break the peel. Have your syrup ready, made of a pound of sugar to a pound of fruit, scald the peaches in it, and add to a peck of peaches one quart of white brandy while the syrup is hot.

Golden-Pippins, to Preserve.—Take the rind of an orange, boil it very tender, and lay it in cold water for three days; take two dozen golden-pippins, pare, core, and quarter them, boil them to a strong jelly and run it through a jelly-bag till it is clear. Take the same quantity of pippins, pare and core them, and put three pounds of loaf-sugar in a preserving-pan, with a pint and a half of spring water; let it boil, skim it well, and put in your pippins with the orange-rind cut into long thin slips; let them boil fast till the sugar becomes thick and will almost candy; then put in a pint and a half of pippin-jelly, and boil till the jelly is clear; then squeeze in the juice of a fine lemon; give the whole another boil, and put the pippins in pots or glasses with the orange-peel. Lemon-peel may be used instead of orange, but then it must only be boiled and not soaked.

PICKLES.—Rules to be observed in Pickling.—Procure always the best vinegar. Vinegar is so grossly adulterated that it is really difficult to obtain it pure. The success of your pickle depends on the goodness of your vinegar.

Use glass bottles or stone jars for your pickles; if earthen jars, they must be unglazed, as the vinegar, acting upon the glazing, produces a mineral poison. Use sauce-pans lined with earthen-ware, or stone pipkins, to boil your vinegar in. If you are compelled to use tin, do not let your vinegar remain in it one moment longer than actually necessary; employ also wooden knives and forks in the preparation of your pickles. Fill your jars three parts full with the articles to be pickled, and then add vinegar up to the neck of the jar or bottle.

When greening, keep the pickles covered down, or the evaporation of the steam will injure the color; a little alum may be added to crisp the pickles, but it should be very small in proportion to the quantity, or it will give a disagreeable flavor.

Pickles should occasionally be looked over, that the softest, and those least likely to keep well may be used first. Store pickles, or those intended for use the following summer, should be assorted from the remainder when first made; choose those most firm; put them into stone or glass-ware, with fresh vinegar to cover them; cover the vessel close.

Beans, radish-pods, tomatoes, small cucumbers, green plums, and nasturtions may be put in a jar together for assorted pickles, with a few onions, if liked. Five or six peppers among two or three hundred cucumbers will make them sufficiently strong. Should the vinegar on pickles become white or weakened, turn it off, scald, and skim it, and return it to them either hot or cold.

Asparagus, Pickled.—Cut and wash the green heads of the largest asparagus; let them lie two or three hours in cold water; scald them very carefully in salt and water; then lay them on a cloth to cool; make a pickle according to the quantity of your asparagus, of vinegar and salt, and boil it. To a gallon of pickle put two nutmegs, a quarter of an ounce of mace, the same of whole white pepper, and pour the pickle hot over them; cover the jar with a thick cloth, and let it stand a week; then boil the pickle; when it has stood another week, boil it a third time; when cold, cover the jar close.

Beans, French, Pickled.—Lay them in salt and water for nine days, then add a little vinegar, and boil them in the liquor; when they become green drain them, wipe them dry, and put the beans into a jar; boil some vinegar, ginger, mace, pepper, cloves, and mustard-seed, all bruised, and while hot pour it on the beans; cover them close when cold.

Cabbage, Red, to Pickle.—Quarter a purple-red cabbage; cut out the stalk, then slice down the cabbage endwise; put them on a drying-sieve, sprinkle each layer of cabbage with salt, which lay and drain two or three days; then put it into a jar, boil some vinegar with spice tied up in a muslin bag; cut a beet-root of good color into slices; the branches of cauliflower cut off, after it has lain in salt, will look and be of a beautiful red; put it into a stone jar, and pour boiling vinegar over it.

Cucumbers, Young.—Choose nice young gherkins, lay them upon dishes, sprinkle salt over them, let them lie a week, drain them off, and put them into stone jars; pour boiling vinegar over them, place them near the fire, cover them well with vine-leaves, and if not a good green, pour off the vinegar and boil it again; cover them with fresh vine-leaves, and continue doing so until they are a good color; as, to make a better green, you must use a metal stew-pan or brass skillets, which are very pernicious and poisonous.

Use wooden spoons with holes to dish all pickles, keeping them always well covered and free from air. Another method of pickling cucumbers, which is good, is to put them in salt and water, as yor pick them, changing the salt and water once in three or four days. When you have done collecting your cucumbers for pickling, take them out of the salt and water, and turn on scalding hot vinegar, with alum, salt, and pepper-corns in it.

Peaches.—Take those of full growth, ripe, but not soft; wipe them with a flannel cloth, or pare them; stick three or four cloves into each peach; lay them in a stone jar. Put half a pound of sugar to a quart of good vinegar, add cinnamon and other spices to the taste; let the vinegar come to a boil, skim, and pour it on the peaches. Let them stand two weeks; then pour off the vinegar and boil it, and pour it on again, and they are then fit for use.

Onions, to Pickle.—Peel the onions till they look white; boil some strong salt and water, and pour it over them; let them stand in this twenty-four hours; keep the vessel closely covered to retain the steam; after that time wipe the onions quite dry, and when they are cold pour boiling vinegar, with ginger and white pepper, over them; take care the vinegar always covers the onions.

Mangoes.—Procure musk-melons as late in the season as possible; if pickled early, they are not apt to keep well. Cut a small piece from the under side; take out the seeds, and if the citron or nutmeg melons are used for mangoes, the rough part should be scraped off. The long, common musk-melons make the best mangoes. Soak the melons in salt and water three or four days; then tak them out of the water; sprinkle on the inside of the melons powdered cloves, pepper, and nutmeg; fill them with small strips of horseradish, cinnamon, and small string-beans. Flag-root, nasturtions, and radish-tops, are also nice to fill them with. Fill the crevices with American mustard-seed. Put back the pieces of melon that were cut off, bind it up tight with white cotton cloth, and sew it on. Lay the melons in a stone jar, with the part that the covers are on up. Put into vinegar for the mangoes, alum, salt, and pepper-corns, in the same proportion as for cucumbers; heat it scalding hot, and put it over, then cover with a folded towel; let them stand for one night; drain off the vinegar, make it hot again, and pour it on; cover as before; repeat this scalding four or five times, if necessary, until the mangoes are a fine green; three times is generally enough.

Caution.—Pickles sold in the shops are found to be adulterated with various compounds; but the greatest evil lies in the fact that they are frequently impregnated with copper. In the case of preserves, the copper probably proceeds from the use of copper pans in making the preserves, but with regard to pickles, copper is employed to improve their color, and sulphuric acid to strengthen bad vinegar. The best way is to avoid purchasing the pickles sold in clear glass bottles, and presenting a most tempting appearance.

VEGETABLES, SALADS, etc.—Vegetables form a most important feature in the art of cooking. Much depends upon boiling greens, and the manner in which it is done; the water should be soft; a handful of salt should be thrown into the water, which should be made to boil before the greens are put in; it should then be made what cooks

term 'gallop;" the sauce-pan should be kept uncovered, and when the greens sink they are done; take them out, and quickly, too. Vegetables are a most useful accessory to our daily food, and should be made the object of a greater study than they are usually.

Care should be taken in the preservation of vegetables for winter use.

Green beans may be preserved by being packed in layers of salt. They should be soaked before being used. Carrots, beans, beet-roots, parsnips, and potatoes keep best in dry sand or earth in a cellar; turnips keep best on a cellar bottom, or they may be kept the same as carrots, etc. Whatever earth remains about them, when taken from the ground, should not be taken off. When sprouts come on potatoes or other stored vegetables, they should be carefully cut off.

Celery may be kept in the cellar all winter, by setting it in boxes filled with earth. Cabbage keep some time, by being laid on a stone floor in the cellar.

To keep pumpkin, it should be cut up and dried, or stewed and made up into cakes, which should be thoroughly dried in the oven or in the sun.

Parsley should be gathered when young and tender, and packed in a little sweet butter.

Asparagus.—Let the stalks be lightly but well scraped, and as they are done, be thrown into cold water; when all are finished, fasten them into bundles of equal size; put them into boiling water; throw in a handful of salt; boil until the end of the stalk becomes tender; it will be about half an hour; cut a round of bread, and toast it to a clear brown; moisten it with the water in which the asparagus was boiled, and arrange the stalks with the white end outward. A good melted butter must accompany it to table. Asparagus should be dressed as soon after it has been cut as practicable.

Asperge a la Pois—French Recipe.—When asparagus is first in season, and too small to make a handsome appearance, this mode of dressing is very good: take the asparagus and cut off only the green heads; none of the white stalk must be retained; put them into clear, cold water, and when clean, pop them into boiling water, in which salt has been thrown; in ten minutes they will be tender; they may then be taken out and laid upon a white cloth, which must be used to wipe them dry; lay in a stew-pan a slice of butter; when it is melted, put in the asparagus; stew them over a quick fire; keep them turning; when ten minutes have elapsed, dredge a little flour, and a small quantity of white sugar, in powder, over them; beat up the yolks of a couple of eggs; pour over the asparagus just sufficient water to cover them; boil up rapidly; stir in the yolk of one egg; and, making a pyramid of the asparagus in the dish, serve very hot.

Beets.—Break off the leaves, but do not cut beets, as that spoils both flavor and appearance; wash them and boil them till tender; then take them out into a basin of cold water, and rub all the outside skin off with the hands; then slice them thin in a dish, and just cover them with cold vinegar, and sprinkle with pepper and salt, or quarter them, and lay them for a day or two in cold vinegar, as they are then fit for use. The tops of young beets are dressed as asparagus.

Broccoli.—Peel the thick skin of the stalks, and boil for a quarter of an hour, with salt in the water. The small shoots will only require half the time. They should be tied in bunches. Serve with toast and melted butter.

Green or Stringed Beans.—Get young, tender beans; take off the stem end and the strings from the sides of the beans, and cut them in lozenges of an inch in length; then boil them tender in water to cover them. Some boil a bit of salt pork with them, or add to them, when dished, butter, salt, and pepper, to taste. Green corn, cut from the cob, is cooked with them, and called succotash.

Celery.—Scrape and wash it well; let it lie in cold water until just before being used; dry it with a cloth; trim it, and split down the stalks almost to the bottom. Send it to table in a celery glass, and eat with salt only; or chop it fine, and make a salad dressing for it.

Cabbage and Cauliflowers.—Trim off the loose leaves of the cabbage; cut the stalk in quarters, to the heart of the cabbage; boil it an hour. If not boiled with corned meat, put a little salt in the water in which they are boiled. White cauliflowers are the best. Take off the outside leaves; cut the stalk close to the leaves; let them lie in salt and cold water for half an hour, before boiling them. Boil them fifteen or twenty minutes, according to the size. Milk and water is the best to boil them in, but clear water does very well. Put a little salt in the pot in which they are boiled.

Cabbage Salad and Cole-Slaw.—Take a hard, close head of cabbage; cut it in two, and with a sharp knife shave it fine; lay it in a dish, and garnish and finish as lettuce. For cole-slaw, cut it in the same way; then add to it a good bit of butter, some vinegar, pepper and salt to taste, and put it in a clean stew-pan; set it on the fire, and stir it with a silver spoon until the seasoning is mixed, and the butter melted. Serve in a covered dish.

Red Cabbage.—This is eaten as salad, prepared as directed for cabbage salad or cole-slaw, or it may be shaved fine and pickled.

Carrots.—Carrots may be plain boiled, and served with a drawn butter sauce. They are generally used in soups, sliced or grated.

Stewed Cucumbers.—Take two or three straight cucumbers; cut off one end; then take out the seeds; lay them in vinegar, water, pepper, and salt; have some good farce, and fill each cucumber with it; dry your cucumbers well out of the vinegar first; then dry them in a clean rubber; then fry them, if for brown; if for white, not; take them out of the butter, and put them to stew into some good stock, one large onion, a fagot of herbs, a slice of lean ham, until tender; thicken the liquor, and strain; season with vinegar, lemon juice, sugar, salt, and white pepper; glaze the cucumbers several times.

Greens.—White mustard, spinach, water-cresses, dandelions, and the leaves and roots of very small beets, are the best greens. Boil them, with a little salt and saleratus in the water. If not fresh and plump, soak them in salt and water half an hour, before cooking them. When they are boiled enough, they will sink to the bottom of the pot.

Lettuce.—Strip off the outside leaves; split it, and lay it in cold water awhile. Drain and lay in a salad dish. Have ready two hard-boiled eggs; cut in two, and lay on the leaves. If you choose, it may be dressed with sugar and vinegar, with a little salt, before it goes to the table. Some prefer a dressing of salt, mustard, loaf-sugar, vinegar, sweet oil, and a mashed hard-boiled egg, with the salad cut fine and this over it.

Hominy.—There are three sizes of hominy; the middle size is best—wash a tea-cup of it well in two or three waters; all that is not good will rise to the top, drain it carefully off; then put to it a quart of water, and let it stand all night; in the morning add to it a teaspoonful of salt, and set the vessel which contains it over the fire, in a kettle of boiling water; one hour will boil it; the reason for putting it in water is, that otherwise it is very apt to turn; when it has absorbed all the water, stir it well with a spoon and serve. Coarse hominy requires five or six hours' boiling. Dried beans are cooked with it.

Onions.—White onions are best for boiling. Take off the skins and lay them in cold water for an hour or two before boiling. When boiled tender serve them with butter, pepper, and salt over, or a drawn butter. The red ones are good sliced thin, with vinegar, pepper, and salt. Onions may be fried like potatoes.

Green Pease.—A delicious vegetable, a grateful accessory to many dishes of a more substantial nature. Green pease should be sent to table *green;* no dish looks less tempting than pease if they wear an autumnal aspect. Pease should also be young, and as short a time as possible should be suffered to elapse between the periods of shelling and boiling. If it is a matter of consequence to send them to table in perfection, these rules must be strictly observed. They should be as near of a size as a discriminating eye can arrange them; they should then be put in a cullender, and some cold water suffered to run through them in order to wash them; then, having the water in which they are to be boiled slightly salted, and boiling rapidly, pour in the pease; keep the sauce-pan uncovered, and keep them boiling swiftly until tender; they will take about twenty minutes, barely so long, unless older than they should be; drain completely, pour them into the tureen in which they are to be served, and in the center put a slice of butter, and when it has melted stir round the pease gently, adding pepper and salt; serve as quickly and as hot as possible.

Pease Stewed in Cream.—Put two or three pints of young green pease into a sauce-pan of boiling water; when they are nearly done and tender drain them in a cullender quite dry; melt two ounces of butter in a clean stew-pan, thicken it evenly with a little flour, shake it over the fire, but on no account let it brown, mix smoothly with it the fourth of a pint of cream, add half a teaspoonful of white sugar, bring it to a boil, pour in the pease, and keep them moving until they are well heated, which will hardly occupy two minutes. Send them to table immediately.

How to Cook Potatoes.—To Boil Potatoes.—In Ireland potatoes are boiled in perfection. Potatoes should always be boiled in their "jackets;" peeling a potato before boiling is offering a premium for water to run through it and go to table waxy and unpalatable; they should be thoroughly washed and put into cold water. In Ireland they always nick a piece of the skin off before they place them in the pot; the water is gradually heated, but never allowed to boil; cold water should be added as soon as the water commences boiling, and it should thus be checked until the potatoes are done, the skins will not then be broken or cracked until the potato is thoroughly done;

pour the water off completely, and let the skins be thoroughly dry before peeling.

To Boil New Potatoes.—The sooner the new potatoes are cooked after being dug the better they will eat; clear off the loose skins with a coarse towel and cold water; when they are thoroughly clean put them into scalding water, a quarter of an hour or twenty minutes will be found sufficient to cook them; strain off the water dry, sprinkle a little salt over the potatoes and send them to table. If very young, melted butter should accompany them.

To Boil Irish Potatoes.—Wash your potatoes, then pare them, and throw them into a pail of cold water; let them stand several hours, if convenient. Put them into boiling water, with a little salt, let them boil about twenty minutes, or till you can pass a fork through them, pour off the water, and let them stand a few moments to dry. Take them out one or, if small, two at a time into a clean crash-towel and wring them. They will be dry and mealy, as twenty years' experience has proved.

Roasted Potatoes.—Clean thoroughly; nick a small piece out of the skin, and roast in the oven; a little butter is sometimes rubbed over the skin to make them crisp.

Potatoes in Haste.—A very nice little dish may be made of potatoes, in about fifteen minutes (or less if the water is boiling): peel and cut some potatoes in slices, a quarter or half an inch thick; pour on them boiling water, enough to cover them, and let them boil till tender; skim them; then add butter with flour, worked in it in proportion to the quantity of potatoes, let it boil up once, add a little chopped parsley, and serve, with the addition of pepper to taste.

Fried or Broiled Potatoes.—Cut cold boiled potatoes in slices a quarter of an inch thick; have ready a frying-pan with hot lard or dripping, in which put some salt, lay in the potatoes, and let them fry a delicate brown, turning them as they require, or lay them on a gridiron over bright coals, and as they are done take them on a hot dish, with butter, pepper, and salt to taste.

Potatoes Glazed.—Boil well; skim them; choose the most floury, roll them in yolk of egg, and place them before the fire to brown.

Potato Rissoles.—Boil the potatoes floury; mash them, seasoning with salt and a little cayenne; mince parsley very finely, and work up with the potatoes, adding an onion also chopped small; bind with yolk of egg, roll into balls, and fry with fresh butter over a clear fire. Meat shred finely, bacon, or ham, may be added.

Pototo Ragout.—Mash floury potatoes, make them into balls with yolk of egg, flour, and fry them; drain off all grease, cover them with brown sauce, and serve.

Porridge, or Soup of Potatoes.—Mash them; after having boiled them quite hot, mix them with some fine white veal gravy, thicken with cream; it should, when done, be of the consistency of apple-sauce.

To Mash Potatoes.—Boil the potatoes as above; peel them, remove all the eyes and lumps; beat them up with butter and salt until they are quite smooth; force them into a mould which has been previously floured, turn into a tureen, which the flour will enable you easily to do; brown them before the fire, turning gently so as not to injure the shape, and when a nice color send to table. They are sometimes coated with white of egg, but they may be cooked without.

Potato-Balls.—Mash some floury potatoes quite smooth, season with pepper and salt, add fresh butter until sufficiently moist, but not too much so; make into balls, roll them in vermicelli crumbled, or bread crumbs; in the latter case they may be brushed with the yolk of egg fry them a nice brown. Serve them on a napkin, or round a dish of mashed potatoes which has not been moulded.

Sweet Potatoes, Baked.—Wash them perfectly clean, wipe them dry, and bake in a quick oven, according to their size—half an hour for quite small size, three-quarters for larger, and a full hour for the largest. Let the oven have a good heat, and do not open it, unless it is necessary to turn them, until they are done.

Parsnip Fritters.—Boil four or five parsnips; when tender, take off the skin and mash them fine, add to them a teaspoonful of wheat flour and a beaten egg; put a tablespoonful of lard or beef dripping in a frying-pan over the fire, add to it a saltspoonful of salt; when boiling hot put in the parsnips, make it in small cakes with a spoon; when one side is a delicate brown turn the other; when both are done, take them on a dish, put a very little of the fat in which they were fried over, and serve hot. These resemble very nearly the taste of the salsify or oyster plant, and will generally be preferred.

Parsnips.—Wash parsnips and boil them with the skins on; when done, scrape them and slice them, with butter, pepper, and salt; or fry them as potatoes in hot lard—or they may be stewed down with meat.

Radishes.—Wash them, and let them lie in clean cold water as soon as they are brought in. Before they go to table scrape off the outside skin, trim the sharp end, leave the stalk about an inch long; if large, split them in four half-way down, and send them to the table in tumblers, to be eaten with salt.

Squashes.—Summer squashes, if very young, may be boiled whole—if not, they should be pared, quartered, and the seeds taken out. When boiled very tender, take them up, put them in a strong cloth, and press out all the water—mash them; salt and butter them to your taste. The neck part of the winter squash is the best. Cut it in narrow strips, take off the rind, and boil the squash in salt and water till tender—then drain off the water, and let the squash steam over a moderate fire for ten or twelve minutes. It is good mashed—if mashed, add a little butter.

Green Sweet Corn.—Corn is much sweeter to be boiled in the cob. If made into succotash, cut it from the cobs, and boil it with Lima beans, and a few slices of salt pork. It requires boiling from fifteen to thirty minutes, according to its age.

Sea-Kale requires to be very well done—there is little occasion to fear doing it too much; tie in bundles after washing and trimming, boil it in equal parts of milk and water, and serve it with melted butter. It may be laid on toast or not, according to taste.

After being well boiled it must be thoroughly drained before laying upon the toast; five-and-twenty minutes will be found sufficient to boil it.

Porridge of Turnips.—Pare and cut up several turnips into slices, put them on to boil in milk and water until tender, strain them on the back of a sieve, throw away the liquor, and rub through the turnips; when done put them into a stew-pan with a piece of butter, a spoonful of flour, a gill of cream, a little sugar, salt, and cayenne pepper.

Broiled Mushrooms.—Pare some large open mushrooms, leaving the stalks on, paring them to a point; wash them well, turn them on the back of a sieve to drain. Put into a stew-pan two ounces of butter, some chopped parsley and onions; fry them for a minute on the fire; when melted, place your mushroom-stalks upward on a pan, then pour the butter and parsley over all the mushrooms; pepper and salt them well with black pepper, put them in the oven to broil; when done put a little good stock to them, give them a boil, and dish them; pour the liquor over them, add more gravy, but let it be put in hot; an hour and a quarter before it is done add four tablespoonfuls of red wine to the liquor; serve very hot.

Salad.—Take one or two lettuces, split them in two, thoroughly wash them, and drain the water from them, then cut them into small pieces, and mix them with small salad, celery, and beet-root; cut in small pieces some young radishes, and sliced cucumber, and an egg boiled hard cut into pieces and garnished about them. Make a sauce with the yolks of two eggs boiled hard, which rub well together in a basin with a wooden spoon; add a little pepper, salt, and mustard; when these are mixed to a smooth paste put in a few teaspoonfuls of sweet oil, mixing it well between each spoonful; then mix in a few teaspoonfuls of vinegar in the same manner; when the sauce is mixed according to the directions it will never require shaking, and will always look like cream; pour this over the salad, or serve it in a cruet.

Salsify or Vegetable Oyster.—The best way to cook it is to parboil it, (after scraping off the outside), then cut in slices, dip it into a beaten egg and fine bread-crumbs, and fry it in lard. It is very good broiled, then stewed a few minutes in milk, with a little butter and salt. Another way, which is very good, is to make a batter of wheat flour, milk, and eggs; cut the salsify in thin slices (after having been boiled tender), put them into the batter with a little salt; drop this mixture into hot fat by the large spoonful. When a light brown they are cooked sufficiently.

Tomatoes, if very ripe, will skin easily; if not, pour scalding water on them, and let them remain in it four or five minutes. Peel and put them in a stew-pan, with a tablespoonful of water, if not very juicy; if so, no water will be required. Put in a little salt, and stew them for half an hour; then turn them into a deep dish with buttered toast. Another way of cooking them, which is considered very nice by epicures, is to put them in a deep dish, with fine bread-crumbs, crackers pounded fine, a layer of each alternately; put small bits of butter, a little salt and pepper on each layer—some cooks add a little nutmeg and sugar. Have a layer of bread-crumbs on the top. Bake it three-quarters of an hour.

Tomatoes, Raw.—Tomatoes may be sliced thin, and served with salt, pepper, and vinegar over, for breakfast; or sliced, and strewn with sugar and grated nutmeg, for tea; for dinner they may be stewed, or broiled, or baked.

Southern Mode of Boiling Rice.—Have the water boiling. Allow at least two quarts of water to a pint of rice; throw in a teaspoonful of salt; wash and pick clean and put in; let it boil twenty minutes, and if not then dry, turn off the water, and let it stand on the coals a few moments with the lid off. The kernels will be white, and preferred by many. Use in the place of pudding, with a sweet sauce, or with meats as a vegetable. Rice is better for being soaked two or three hours.

COFFEE, TEA, CHOCOLATE, COCOA.—Coffee and tea have now become such universal beverages for the morning or after-dinner meal, that, beyond a few general directions, little remains for prefatory matter.

Coffee should be purchased in the berry, and fresh roasted; it should always, when possible, be ground just previous to being made. After it is ground, it should not be exposed to the air, as the aroma speedily flies off. If more is ground than is required for the meal, keep it in a glass bottle closely stopped, or a tight tin canister. Coffee, like tea, should be an infusion, not a decoction.

The best coffee is the Mocha, the next is the Java, and closely approximating is the Jamaica and Berbice.

Of tea, little need be said; almost every one knows the rules for making it.

Boiling water should alone be used.

Earthen tea-pots in preference to metal.

Silver is better than either.

Chocolate can only be obtained pure of a first-rate house; that commonly sold is most infamously adulterated.

Cocoa is the foundation of chocolate; it may be pounded, and either boiled as milk, or boiling water may be poured upon it. It is very digestible, and of a fattening nature.

COFFEE AND TEA.—**Coffee.**—The adulterations of tea and coffee pointed out by Dr. Hassall are not of a serious nature, being confined to *flour*, *starch*, *potato-farina*, *sago-meal*, *wheat-flour*, *tapioca-starch*, *Maranta*, and other *arrowroots*, *tous les mois*, and *animal fats;* but as the latter are employed in the roasting of all farinaceous grains, to prevent the burning thereof, and also to preserve as far as possible their essential oils from destruction by heat, we see nothing to make our readers uncomfortable. Those who prefer the pure cocoa can obtain the "nibs," or more properly "beans," and grind them. But many prefer the soluble cocoa, which is simply cocoa modified by admixture with less stimulating substances.

To make good common coffee, allow a tablespoonful of it, when properly roasted and ground, to each pint of water. Turn on the water boiling hot, and boil the coffee in a tin pot from twenty to twenty-five minutes—if boiled longer, it will not taste fresh and lively. Let it stand, after being taken from the fire, four or five minutes to settle; then turn it off carefully from the grounds, into a coffee-pot or urn. When the coffee is put on the fire to boil, a piece of fish-skin (prepared and dried for that purpose,) or isinglass of the size of a shilling, should be put in, or the white and shell of half an egg, to a couple of quarts of coffee. When cream cannot be procured for coffee, the coffee will be much richer to boil it with a less proportion of water than the above rule, and weaken it with boiling-hot milk, when served out in cups.

Another way for making coffee is, to put the ground coffee into a wide-mouthed bottle overnight, and pour rather more than half a pint of water upon each ounce and a half, and to cork the bottle; in the morning to loosen the cork, put the bottle into a pan of hot water, and bring the water to a boiling heat. The coffee is then to be poured off clear, and the latter portion strained; that which is not drank immediately is kept closely stopped, and is heated as it is wanted. Coffee is adulterated with chiccory, roasted beans, pease, and acorns; but chiefly by chiccory. Having your own mill, buy the roasted beans; find out a respectable grocer, ascertain his roasting-days, *and always buy from a fresh roast.* If you like the flavor of chiccory, purchase it separate, and add to taste. Chiccory, in small quantities, is not, as has been represented, injurious, but healthful; because the "taraxacum" root has been used medicinally, and its name has found a place in Pharmacopœias, it has been vulgarly set down as "physic," and thrown to the dogs. The tonic hop might be discarded upon the same pretext. Chiccory is a healthful addition to coffee, but you need not pay the coffee price for it. Grind your coffee, and mix with chiccory for yourself.

Coffee, to Roast.—Coffee should never be roasted but when you are going to use it, and then it should be watched with the greatest care, and made of a gold color; mind and do not burn it, for a few grains burnt would communicate a bitter taste to the whole; it is the best way to roast it in a roaster which turns with the hand, over a charcoal fire, as, by that means, it will not be forgotten, which is very often the case when in the oven, or before the fire.

A Substitute for Cream for Coffee.—Beat up a fresh egg, then pour boiling water on it gradually to prevent its curdling. It is difficult to distinguish it from rich cream.

Coffee Milk.—Boil a dessertspoonful of coffee in nearly a pint of milk a quarter of an hour, then put in a little isinglass and clear it, and let it boil a few minutes, and set it on the fire to grow fine.

Coffee Cream.—Mix three cups of good coffee with one pint of cream, and sugar according to taste; boil them together, and reduce them about one-third; observe that the coffee must be done as if it was for drinking alone, and settle very clear before you mix it with the cream.

Coffee, to give it the Flavor of Vanilla.—Take a handful of oats, very clean, and let them boil for five or six minutes in soft water; throw this away, and fill it up with an equal quantity, and let it boil for half an hour; then pass this decoction through a silk sieve, and use it to make your coffee, which will acquire, by this means, the flavor of vanilla, and is very nice.

CHOCOLATE.—According as you intend to make this, either with milk or water, for each cup of one or the other of these liquids put into a chocolate-pot, add one ounce of cake chocolate. Some persons dissolve the chocolate before they put it into the milk; let it boil slowly or just simmer for half an hour; add cream or milk to it, and sugar to taste; or the sugar may be omitted until served.

Tea.—Scald the tea-pot, and if the tea is a strong kind, a teaspoonful for a pint of water is sufficient; if it is a weak kind, more will be required. Pour on just enough boiling water to cover the tea, and let it steep. Green tea should not steep more than five or six minutes before drinking; if steeped longer, it will not be lively. Black tea requires steeping ten or twelve minutes to extract the strength.

Tea is adulterated with leaves of the sycamore, horse-chestnut, and plum; with lie-tea, which is made up of tea-dust, sand and gum, to give it consistency; also with leaves of the beech, bastard plane, elm, poplar, willow, fancy oak, hawthorn, and sloe. It is colored with black-lead, rose-pink, Dutch-pink, vegetable red and yellow dyes, arsenite of copper, chromate and bichromate of potash. Green teas are more adulterated than black. They are colored with Prussian-blue, turmeric, Chinese yellow, etc., flavored with sulphate of iron, catechu-gum, la veno beno, and Chinese botanical powder. Tea-leaves that have been once used, are collected, "doctored," and again sold as fresh tea. Obtain some genuine leaves of tea, moisten them, and lay them out with gum upon paper. Press them between the leaves of books until dry. When you suspect a sample of tea, damp and unroll the leaves, and gum and dry them as genuine ones; you will then be able by comparison to detect the admixture.

HOME-MADE WINES.—Now that fruit and sugar are both so cheap, all housewives may add wines to their household stores as easily as they may preserves. The difficulty and expense of making is trifling, compared with what the latter used to be. Next to the fruit, sugar is the most important ingredient. In wine countries, the grape, under the influence of climate, contains within itself the chemical properties to produce fermentation, while with us artificial aid is compelled to be used to accomplish it. The four requisites for fermentation are sugar, vegetable extract, malic acid, and water; and upon the proper regulation of these constituents the success depends.

The fermentation requires great attention, and should neither be suffered to continue too long, nor be checked too early. Its commencement, which will be about a day after the articles have been mixed, will attract attention by the noise it makes. For a sweet wine, the cask should not be closed until the sound of fermentation has almost ceased. If a dry wine, have ready a barrel which has been subjected to the fumes of sulphur, and draw off your wine into it. Rack off the wine, clearing it with isinglass, and bottle it in about ten weeks after.

Apple-Wine.—Add to a barrel of cider the herb scurlea, the quintessence of wine, a little nitre, and a pound of syrup of honey. Let it work in the cask till clear and well settled; then draw it off, and it will be little inferior to Rhenish, either in clearness, color, or flavor.

Grape-Wine.—To one gallon of grapes put one gallon of water; bruise the grapes; let them stand a week without stirring; then draw it off, and fine. Put to a gallon of wine three pounds of sugar; put it in a vessel, but it must not be stopped till it has done hissing.

Cherry-Wine.—To make five pints of this wine, take fifteen pounds of cherries and two of currants; bruise them together; mix with them two-thirds of the kernels, and put the whole of the cherries, currants, and kernels into a barrel, with a quarter of a pound of sugar to every pint of juice. The barrel must be quite full; cover the barrel with vine-leaves, and sand above them, and let it stand until it has done working, which will be in about three weeks; then stop it with a bung, and in two months' time it may be bottled.

Currant-Wine.—Take sixteen pounds of currants and three gallons of water; break the currants with your hands in the water; strain it off; put to it fourteen pounds of sugar; strain it into a vessel; add a pint of brandy and a pint of raspberries; stop it down, and let it stand three months.

Another.—To every pailful of currants, on the stem, put one pailful of water; mash and strain. To each gallon of the mixture of juice and water add three and a quarter pounds of sugar. Mix well, and put in your cask, which should be placed in the cellar, on the tilt, that it may be racked off in October, without stirring up the sediment. Two bushels of currants will make one barrel of wine. Four gallons of the mixture of juice and water will, after thirteen pounds of sugar are added, make five gallons of wine. The barrel should be filled within three inches of the bung, which must be made air-tight, by placing wet clay over it after it is driven in.

Elder-Wine.—Pour a gallon of boiling water over every gallon of berries; let it stand twelve hours; then draw it off, and boil it up with three pounds and a half of sugar; when boiling, beat up the whites of some eggs, and clarify it; skim it clear; then add half an ounce of pounded ginger to every gallon of the wine; boil it a little longer before you put it in the tub; when cool, put in a toast rubbed in yeast; let it ferment a day or two, after which put it into a barrel previously rinsed with brandy. All wines should be lukewarm when the yeast is added to it.

Raspberry-Wine.—Take three pounds of raisins, wash, clean, and stone them thoroughly; boil two gallons of spring-water for half an hour; as soon as it is taken off the fire pour it into a deep stone jar, and put in the raisins, with six quarts of raspberries and two pounds of loaf-sugar; stir it well together, and cover them closely, and set it in a cool place; stir it twice a day, then pass it through a sieve; put the liquor into a close vessel, adding one pound more loaf-sugar; let it stand for a day and night to settle, after which bottle it, adding a little more sugar.

THE COOK'S TABLE

OF

WEIGHTS AND MEASURES,

By which persons not having scales and weights at hand may readily measure the articles wanted to form any recipe, without the trouble of weighing. Allowance to be made for an extraordinary dryness or moisture of the article weighed or measured.

WEIGHT AND MEASURE.

Wheat flour	one pound is	one quart.
Indian meal	one pound two ounces are	one quart.
Butter, when soft	one pound is	one quart.
Loaf-sugar, broken	one pound is	one quart.
White sugar, powdered	one pound one ounce are	one quart.
Best brown sugar	one pound two ounces are	one quart.
Eggs	ten eggs are	one pound.
Flour	eight quarts are	one peck.
Flour	four pecks are	one bushel.

LIQUIDS, ETC.

Sixteen large tablespoonfuls are	half a pint.
Eight large tablespoonfuls are	one gill.
Four large tablespoonfuls are	half a gill.
Two gills are	half a pint.
Two pints are	one quart.
Four quarts are	one gallon.
A common-sized tumbler holds	half a pint.
A common-sized wine-glass is	half a gill.
A tea-cup is	one gill.
A large wine-glass is	two ounces.
A tablespoonful	half ounce.
Forty drops are equal to	one teaspoonful.
Four teaspoonfuls are equal to	one tablespoonful.

MISCELLANEOUS PRACTICAL RECEIPTS IN HOUSEHOLD ECONOMY.

WASHING.—This is the most difficult and laborious of household duties; and he that shall render its performance shorter and easier will be a public benefactor. Improvements have been made in this as in other arts; and if they were more widely known and generally practiced, this difficult duty would be rendered much more efficient and less tedious than it now is.

Washing Made Easy.—Any family that will use the following receipt will find it worth to them every year more than twice the cost of this book. It saves much time and hard labor, and also much injury in the wearing of clothes. It is not to be used for *colored* clothes. It is used extensively in England and on the continent, and, it is hoped, will become as general in this country. We have found it to be all that is claimed for it. The advantage of this over all others, is in the use of lime, which, without in the least injuring the texture of garments, makes them, by its strong bleaching qualities, a beautiful white.

First, select from the clothes to be washed all the coarse and dirtiest pieces from the fine; then put them in separate tubs of soft water to soak overnight (the night previous to washing). Then prepare, in a separate vessel, the liquid for a large washing, namely, half a pound of good brown soap, cut in small pieces, half a pound of soda, and three ounces of fresh unslacked lime, mixed in one gallon of boiling soft water. Stir well up, so as to mix the ingredients, and let it stand until morning. Then strain off the liquid, being careful to leave all sediment behind. Having ready ten gallons or so of boiling soft water in your boiler, pour in the prepared liquid (keeping out all settlings that may yet be remaining), then throw in your clothes and boil them twenty minutes or half an hour; previous to which, put an earthen plate at the bottom of the boiler, to prevent the clothes from burning. After boiling the appointed time, take them out; scald them, blue them, and rinse them in clean soft water, warm or cold, and your clothes will be as clean and white as snow.

By this method, the finest linens, laces, cambrics, etc., can be readily and easily cleansed with VERY LITTLE TROUBLE. No rubbing the skin off your hands and tearing the clothes to pieces; and the washing for a family of twenty persons completed before breakfast; have the clothes out to dry, the house in good order, all comfortable again for the day, and the family saved from washing-day annoyances. Who *would not wish* to have such comforts?

Should there be only a small washing, and less than ten gallons of water required to boil them in, less of the liquid of *lime*, *soap* and *soda* can be used in proportion. When there is any difficulty in procuring fresh lime, a quantity of the liquor may be made at once from the lime, which will keep for years, corked in bottles and ready for use.

Another Method of Washing—occupying exactly One Hour.—Have a preparation made from two tablespoonfuls of alcohol, two ditto spirits of turpentine, half a pound of brown soap, cut fine and mixed in one quart of hot water. Pour the same into a large tub of boiling water, and allow the clothes to soak for twenty minutes; then take them out and put them in a tub of clean cold water for twenty minutes. Afterward boil them in a like quantity of the above preparation for the other twenty minutes, and rinse in cold water.

N. B. In using either of the above methods of washing, all fine clothes should be gone through with first, as colored, very dirty, or greasy clothes ought not to be boiled with those of a finer fabric, and containing less dirt, as the water in which they are boiled must of course partake more or less of its contents. The same water that has been used for the finer clothes will likewise do for coarse and colored. Should the wristbands of the shirts be very dirty, a little soap may be previously rubbed on.

The above is a very excellent receipt, and may be confided in as particularly effective in *labor saving*.

Another Receipt.—Take one pint of alcohol, one pint spirits of turpentine, two quarts of strong soda-water. Manage the clothes as above directed.

Spirits turpentine, camphene, or Porter's burning fluid, separately, answer a good purpose. Two or three tablespoonfuls to a washing will greatly facilitate the business.

Another Very Good Receipt.—One pound hard soap (for four dozen clothes), seven teaspoonfuls spirits turpentine, five ditto hartshorn, five ditto of vinegar.

Directions.—Dissolve the soap in hot water; mix the ingredients. Then divide the mixture in two parts; put half in the water with the clothes overnight; next morning wring them out. Put them to boil in five or six gallons of water, and add the rest of the mixture; boil thirty minutes, and rinse out thoroughly in cold water; blue them, and hang them out to dry.

This receipt has been found to answer a very valuable purpose, and is worthy of trial.

STARCHING, FOLDING, IRONING, ETC.—To Prepare Starch.—Take two tablespoonfuls of starch dissolved in as much water; add a gill of cold water; then add one pint of boiling water, and boil it half an hour, adding a small piece of spermaceti, sugar, or salt; strain, etc. Thin it with water.

Flour-Starch.—Mix flour gradually with cold water, so that it may be free from lumps. Stir in cold water till it will pour easily; then stir it into a pot of boiling water, and let it boil five or six minutes, stirring it frequently. A little spermaceti will make it smoother. This starch will answer very well for cotton and linen. *Poland starch* is made in the same manner.

Glue-Starch.—Boil a piece of glue four inches square in three quarts of water. Keep it in a bottle well corked. Use for calicoes.

Gum-Starch.—Dissolve four ounces of gum-arabic in a quart of hot water and set it away in a bottle corked. This is used for silks and fine muslins. It can be mixed with water at discretion.

Starching Clothes.—Muslins look well when starched, and clapped dry while the starch is hot, then folded in a damp cloth till they become quite damp, before ironing them. If muslins are sprinkled they are apt to be spotted. Some ladies clap muslins, then dry them, and afterward sprinkle them.

Sprinkling Clothes.—They should be sprinkled with clear water, and laid in separate piles; one of flannels, one of colored, one of common, and one of fine articles.

Folding Clothes.—Fold the fine articles and roll them in a towel, and then fold the rest, turning them all right side outward. Lay the colored articles separate from the rest. They should not remain damp long, as the colors might be injured. Sheets and table linen should be shaken and folded.

Ironing.—In ironing a shirt, first do the back, then the sleeves, then the collar and bosom, and then the front. Iron calicoes generally on the right side, as they thus keep clean for a longer time. In ironing a frock, first do the waist, then the sleeves, then the skirt. Keep the skirt rolled while ironing the other parts, and set a chair to hold the sleeves while ironing the skirt, unless a skirt-board be used. Silk should be ironed on the wrong side when quite damp, with an iron which is not very hot; light colors are apt to change and fade. In ironing velvet, turn up the face of the iron, and, after dampening the wrong side of the velvet, draw it over the face of the iron, holding it straight; always iron lace and needlework on the wrong side, and carry them away as soon as they are dry.

Starching.—Clear-Starching, etc.—To Make Starch for Linen, Cotton, etc.—To one ounce of the best starch add just enough soft cold water to make it (by rubbing and stirring) into a thick paste, carefully breaking all the lumps and particles. When rubbed perfectly smooth, add nearly or quite a pint of boiling water (with bluing to suit the taste), and boil for *at least half an hour*, taking care to have it well stirred all the time, to prevent its burning. When not stirring, keep it covered, to prevent the accumulation of dust, etc. Also keep it covered when removed from the fire, to prevent a scum from rising upon it. To give the linen a fine, smooth, glossy appearance, and prevent the iron from sticking, add a little spermaceti (a piece as large as a nutmeg) to the starch when boiling, and half a teaspoonful of the finest table-salt. If you have no spermaceti (to be had cheap at any druggist's), take a piece of the purest, whitest hogs' lard, or tallow (mutton is the best), about as large as a nutmeg, or twice this quantity of the best refined loaf-sugar, and boil with the starch. In ironing linen collars, shirt-bosoms, etc., their appearance will be much improved by rubbing them, before ironing, with a clean white towel dampened in soft water. The bosom of a shirt should be the last part ironed, as this will prevent its being soiled. All starch should be strained before using.

Receipt for Washing Woolen Goods.—The art of washing woolen goods so as to prevent them from shrinking, is one of the desiderata in domestic economy worthy of being recorded; and it is, therefore, with satisfaction we explain this simple process to our readers. All descriptions of woolen goods should be washed in very hot water with soap; and as soon as the article is cleansed immerse it in cold water; then let it be hung up to be dried.

To Make Calicoes Wash Well.—Infuse three gills of salt in four quarts of boiling water, and put the calicoes in while hot, and leave them till cold; in this way the colors are rendered permanent, and will not fade by subsequent washing. So says a lady who has frequently made the experiment herself. Nothing can be cheaper or quicker done.

How to Make Soap without Boiling.—Take one gallon of lye, strong enough to bear up an egg, to every pound of grease. Put the lye into your barrel, and strain the grease hot through a sieve or cullender. Stir this three or four times a day for several days, or until it thickens. By this process you have soap clearer, and with much less trouble, than in the old way.

Hard Soap.—Take eight pounds of soft soap—if you wish it nice, use that made of olive-oil—boil it two hours with six pounds of common salt, and it will make five pounds of hard soap. Add a little rosin when you melt it over, and if you wish it nice, scent it with fragrant oil.

To Clear-Starch Lace, etc.—Starch for laces should be thicker and useo hotter than for linens. After your laces have been well washed and dried, dip them into the thick hot starch in such a way as to have every part properly starched. Then wring all the starch out of them, and spread them out smooth on a piece of linen, and roll them up together, and let them remain for about half an hour, when they will be dry enough to iron. Laces should never be clapped between the hands, as it injures them. Cambrics do not require so thick starch as net or lace. Some people prefer cold or raw starch for book-muslin, as some of this kind of muslin has a thick clammy appearance, if starched in boiled starch. Fine laces are sometimes wound round a glass bottle to dry, which prevents them from shrinking.

Ironing Laces.—Ordinary laces and worked muslin can be ironed by the usual process with a smoothing or sad-iron; finer laces cannot. When the lace has been starched and dried, ready for ironing, spread it *out as smooth as possible* on an iron-cloth, and pass over it, back and forth, as quickly as you can, a smooth, round glass bottle containing hot water, giving the bottle such pressure as may be required to smooth the lace. Sometimes you may pass the laces over the bottle, taking care to keep them smooth. Either way is much better than to iron laces with an iron. In filling the bottle with hot water, care must be taken not to pour it in too fast, or the bottle will break.

To Raise the Pile of Velvet when Pressed Down.—Warm a smoothing-iron moderately, and cover it with a wet cloth, and lay or hold it under the velvet, on the wrong side. The steam from this will penetrate the velvet, and you can raise the pile with a common brush, and make it appear as good as new.

When Water is Hard, and will not readily unite with soap, it will always be proper to boil it before use; which will be found sufficiently efficacious, if the hardness depends solely upon the impregnation of lime, in the form of what modern chemistry designates as a subcarbonate. The philosophical reason for this is, that the lime, by some secret process of nature, is united to a portion of carbonic acid, which causes it to be suspended in the water: but, in the process of boiling, the carbonic acid unites with the acquired caloric, and is carried off with it into the atmosphere. Even exposure to the atmosphere will produce this effect in a great degree upon spring water so impregnated, leaving it much fitter for lavatory purposes. In both cases the water ought to be carefully poured off from the sediment, as the neutralized lime, when freed from its extra quantity of carbonic acid, falls to the bottom by its own gravity. Boiling, however, has no effect, when the hardness of the water proceeds from lime united with the sulphuric acid, or sulphate of lime of the modern chemistry; and it must be neutralized, or brought to its proper state, by the application of common wood-ashes from the kitchen grate, or of barilla, now called soda, or the Dantzic ashes, or pearlash, or by the more scientific process of dropping in a solution of subcarbonate of potash. Each of these unites with the sulphuric acid, and separates it from the lime, which gravitates, as in the former case, to the bottom. To a pint of fresh-slacked lime, add a gallon of water, and allow the sediment to settle; pour off the clear water, and bottle tightly for use. Half a pint of this should be added to a gallon of hard water, which should be stirred and allowed to settle, after which the clear water is filtered through Canton flannel, and is then fit for use, being quite soft. Having thus philosophically explained the arcana of the washing-tub, we may offer a saving hint in order to economize the use of soap, which is, to put any quantity of pearlash into a large jar, covered from the dust; in a few days the alkali will become liquid, which must be diluted in double its quantity of soft water with its equal quantity of new-slacked lime. Boil it half an hour, frequently stirring it; adding as much more hot water, and drawing off the liquor, when the residuum may be boiled afresh, and drained, until it ceases to feel acrid to the tongue.

Soap and Labor may be Saved by dissolving alum and chalk in bran-water, in which the linen ought to be boiled, then well rinsed out, and exposed to the usual process of bleaching.

Soap may be disused, or nearly so, in the getting up of muslins and chintzes, which should always be treated agreeably to the oriental manner; that is, to wash them in plain water, and then boil them in congee or rice-water: after which they ought not to be submitted to the operation of the smoothing-iron, but rubbed smooth with a polished stone.

The Economy which must result from these processes renders their consideration important to every private family; in addition to which we must state, that the improvements in philosophy extend to the laundry as well as to the wash-house.

Review.—After washing, overlook linen, and stitch on buttons, hooks and eyes, etc.; for this purpose, keep a "housewife's friend," full of miscellaneous threads, cottons, buttons, hooks, etc.

DYEING.—General Directions.—The materials should be perfectly clean; soap should be rinsed out in soft water; the article should be entirely wetted, or it will spot; light colors should be steeped in brass, tin, or earthen; and, if set at all, should be set with alum. Dark colors should be boiled in iron, and set with copperas. Too much copperas rots the thread.

For Coloring Sky-blue.—Get the blue composition. It may be found at the druggist's or clothier's for a shilling an ounce. If the articles are not white, the old colors should be all discharged by soap or a strong tartaric acid water; then rinse. Twelve or sixteen drops of the composition, stirred into a quart bowl of warm soft water, and strained if settlings are seen, will dye a great many articles. If you want a deeper color, add a few drops more of the composition. If you wish to color cotton goods, put in pounded chalk to destroy the acid, which is very destructive to all cotton. Let it stand until the effervescence subsides, and then it may be safely used for cotton as well as silk.

For Lilac Color.—Take a little pinch of archil, and put some boiling-hot water upon it; add to it a very little lump of pearlash. Shades may be altered by pearlash, common salt, or wine.

To Color Black.—Logwood and cider, boiled together in iron—add water for the evaporation—makes a good and durable black. Rusty nails, or any bits of rusty iron, boiled in vinegar, with a small piece of copperas, will also dye black; so will ink-powder, if boiled with vinegar. In all cases, black must be set with copperas.

Lemon-Color.—Peach-leaves, bark scraped from the barberry-bush, saffron, etc., steeped in water, and set with alum, will color a bright lemon; drop in a little gum-arabic to make the articles stiff.

Royal Purple.—Soak logwood chips in soft water until the strength is out; then add a teaspoonful of alum to a quart of the liquor. If this is not bright enough, add more alum. Rinse, and dry. When the dye is exhausted, it will color a fine lilac.

Slate-Color.—Tea grounds, boiled in iron vessels, set with copperas, makes a good slate-color. To produce a light slate-color, boil white maple bark in clear water, with a little alum. The bark should be boiled in brass utensils. The goods should be boiled in it, and then hung where they will drain and dry.

Scarlet.—Dip the cloth in a solution of alkaline or metallic salt, then in a cochineal dye, and let it remain some time, and it will come out permanently colored. Another method: half a pound of madder, half an ounce of cream tartar, one ounce of marine acid to a pound of cloth —put it all together, and bring the dye to a scalding heat. Put in your materials, and they will be colored in ten minutes. The dye must be only scalding hot. Rinse your goods in cold water as soon as they come from the dye.

To Color a Bright Madder.—For one pound of yarn or cloth take three ounces of madder, three ounces of alum, one ounce of cream tartar; prepare a brass kettle with two gallons of water, and bring the liquor to a steady heat; then add your alum and tartar, and bring it to a boil. Put in your cloth, and boil it two hours; take it out, and rinse it in cold water. Empty your kettle, and fill it with as much water as before; then add your madder; rub it in fine in the water before your cloth is in. When your dye is as warm as you can bear your hand in, then put in your cloth, and let it lie one hour, and keep a steady heat; keep it in motion constantly; then bring it to a boil fifteen minutes; then air and rinse it. If your goods are new, use four ounces of madder to a pound.

To Color Green.—If you wish to color green, have your cloth as free as possible from the old color, clean, and rinsed; and, in the first place, color it deep yellow. Fustic, boiled in soft water, makes the strongest and brightest yellow dye; but saffron, barberry-bush, peach-leaves, or onion-skins, will answer pretty well. Next take a bowlful of strong yellow dye, and pour in a great spoonful or more of the blue composition. Stir it up well with a clean stick, and dip the articles you have already colored yellow into it, and they will take a lively grass-green. This is a good plan for old bombazet-curtains, dessert-cloths, old flannel for desk-coverings, etc.

Straw-Color and Yellow.—Saffron, steeped in earthen, and strained, colors a fine straw-color. It makes a delicate or deep shade, according to the strength of the tea. The dry, outside skins of onions, steeped in scalding water, and strained, color a yellow very much like the "bird of paradise" color. Peach-leaves, or bark scraped from the barberry-bush, color a common bright yellow. In all these cases, a little bit of alum does no harm, and may help to fix the color. Ribbons, gauze handkerchiefs, etc., are colored well in this way, especially if they be stiffened by a bit of gum-arabic, dropped in while the stuff is steeping.

Drab-Color.—Take plum-tree sprouts, and boil them an hour or more; add copperas, according to the shade you wish your articles to be. White ribbons take very pretty in this dye.

To Dye Purple with Cochineal.—Boil an ounce of cochineal in a quart of vinegar.

To Dye Brown.—Use a teaspoon of soda to an ounce of cochineal and quart of soft water.

To Color Pink.—Boil one pound of cloth an hour in alum-water; pound three-quarters of an ounce of cochineal and mix with one ounce of cream of tartar; put in a brass kettle, with water enough to cover the cloth; when about blood-heat, put in your cloth; stir constantly, and boil about fifteen minutes.

To Dye a Coffee-Color.—Use copperas in a madder-dye, instead of madder compound.

Nankin-Color.—The simplest way is to take a pailful of lye, to which put a piece of copperas half as big as a hen's egg. Boil in a copper or tin kettle.

To Make Rose-Color.—Balm blossoms, steeped in water, color a pretty rose-color. This answers very well for the linings of children's bonnets, for ribbons, etc.

To Dye Straw and Chip Bonnets Black.—Boil them in strong logwood liquor three or four hours, occasionally adding green copperas, and taking the bonnets out to cool in the air, and this must be continued for some hours. Let the bonnets remain in the liquor all night, and the next morning take them out, dry them in the air, and brush them with a soft brush. Lastly, rub them inside and out with a sponge moistened with oil, and then send them to be blocked.

To Dye White Gloves a Beautiful Purple.—Boil four ounces of logwood and two ounces of roche-alum, in three pints of soft water, till half wasted. Let it stand to be cold after straining. Let the gloves be nicely mended; then do them over with a brush, and when dry repeat it. Twice is sufficient, unless the color is to be very dark. When dry, rub off the loose dye with a coarse cloth. Beat up the white of an egg, and with a sponge rub it over the leather. The dye will stain the hands, but wetting them with vinegar before they are washed will take it off.

To Bleach Straw Hats, etc.—Straw hats and bonnets are bleached by putting them, previously washed in pure water, in a box with burning sulphur; the fumes which arise unite with the water on the bonnets, and the sulphurous acid thus formed bleaches them.

To Dye Silks Black.—To eight gallons of water add four ounces of copperas; immerse for one hour and take out and rinse. Boil two pounds logwood chips, or one half-pound of extract; one half-pound of fustic; and for white silks, one half-pound of nicwood; dissolve two pounds of good bar-soap in a gallon of water; mix all the liquids together, and then add the soap, having just enough to cover the silk. Stir briskly until a good lather is formed, then immerse the silk and handle it lively. The dye should be as warm as the hand will bear. Dry quickly and without rinsing. The above is enough for ten yards, or one dress.

To Color Yellow on Cotton.—Wet six pounds of goods thoroughly; and to the same quantity of water add nine ounces of sugar of lead; and to the same quantity of water in another vessel add six ounces of bichro mate of potash. Dip the goods first into the solution of sugar of lead, and next into that of the potash, and then again into the first. Wring out, dry, and afterward rinse in cold water.

For Orange.—Prepare a lime-water as for whitewash; the stronger it is the deeper will be the color. Pour off the water and boil. While boiling dip the goods which you have already colored yellow. The above solutions to be cold, except the lime-water. These colors will not fade.

WHITEWASHING.—To Make Whitewash that will not rub off.—Mix up half a pailful of lime and water ready to put on the wall; then take one gill of flour and mix it with the water; then pour on it boiling water sufficient to thicken it; then pour it, while hot, into the whitewash; stir it all well together, and it is ready for use. But if you wish for yellow wash, take horseradish leaves half a pailful, boil them as if for greens, filter, and add the juice to the foregoing composition, and it will be a beautiful yellow.

Excellent Cheap Whitewash.—Slack the lime as usual, except that the water used should be hot, and nearly saturated with salt; then stir in four handfuls of fine sand, to make it thick like cream. Coloring matter can be added to both, making a light stone-color, a cream-color, or a light buff.

Brilliant Whitewash.—Many have heard of the brilliant stucco whitewash on the east end of the President's house at Washington. The following is a receipt for it; it is gleaned from the *National Intelligencer*, with some additional improvements learned by experiments. Take half a bushel of nice unslacked lime, slack it with boiling water, cover it during the process to keep in the steam. Strain the liquid through a fine sieve or strainer, and add to it a peck of salt, previously well dissolved in warm water; three pounds of ground rice, boiled to a thin paste, and stirred in boiling hot; half a pound of powdered Spanish whiting, and a pound of clean glue, which has been previously dissolved by soaking it well, and then hanging it over a slow fire, in a small kettle within a large one filled with water. Add five gallons of hot water to the mixture, stir it well, and let it stand a few days covered from the dirt.

It should be put on right hot; for this purpose it can be kept in a kettle on a portable furnace. It is said that about a pint of this mixture will cover a square yard upon the outside of a house if properly applied. Brushes more or less small may be used according to the neatness of the job required. It answers as well as oil-paint for wood, brick, or stone, and is cheaper. It retains its brilliancy for many years. There is nothing of the kind that will compare with it, either for inside or outside walls.

Coloring matter may be put in and made of any shade you like. Spanish brown stirred in will make red pink, more or less deep according to the quantity. A delicate tinge of this is very pretty for inside walls. Finely-pulverized common clay, well mixed with Spanish brown, make a reddish stone-color. Yellow ochre stirred in makes yellow wash, but chrome goes farther, and makes a color generally esteemed prettier. In all these cases the darkness of the shades is of course determined by the kind and quantity of coloring matter employed.

PAINTING.—In this article we shall not give directions for ordinary oil painting; but for those cheap and valuable substitutes for it, which every householder can prepare and apply, and which will be found equally efficient for the preservation of out-buildings, fences, farm implements, etc.

A Cheap and Durable Cement.—A most valuable and durable cement for the outside covering of wood-buildings and fences may be obtained by mixing two parts of sifted wood-ashes, one of fine sand, and three of clay; these being again mixed with oil, and applied to the surface of the wood, are said to be capable of resisting the inclemency of the weather even better than marble itself.

Black Paint made from Potatoes.—The "American Mechanic" says, on the authority of an old painter, that potatoes, being baked moderately at first in a close vessel from which air is excluded, and exposed to increased heat until they are completely charred through, may be ground in oil, and thus produce a beautiful black, superior in many respects to any other black in use.

Substitute for White-Lead.—Take one bushel of unslacked lime, and slack it with cold water. When slacked, add twenty pounds of Spanish whiting, seventeen pounds of salt, and twelve pounds of sugar. Strain this mixture through a wire-sieve, and it will be fit for use, after reducing it with water. This is intended for the outside of buildings, or where it is exposed to the weather. Two coats should be laid on wood and three on brick. A whitewash-brush may be used for laying it on, and each coat must be dried before the next is applied. This may be made of any color you please. For straw-color, instead of the whiting use yellow ochre; for lemon-color, ochre and chrome yellow; for lead, or slate-color, lampblack; for blue, indigo; and for green, chrome green.

A Substitute for White Oil-Paint.—Four quarts of skim-milk; one pound of fresh-slacked lime; twelve ounces of linseed oil; four ounces of white Burgundy pitch; six pounds of Spanish white; to be mixed as follows: the lime to be slacked in water, exposed to the air, mixed in about one-fourth of the milk; the oil, in which the pitch is to have been previously dissolved, to be added a little at a time; then the rest of the milk, and afterward the Spanish white. This quantity is sufficient for more than fifty square yards with two coats.

Cheap Paint for a Barn.—An excellent and cheap paint for rough wood-work is made of six pounds of melted pitch, one pint of linseed-oil, and one pound of brick-dust or yellow ochre.

A Varnish to Prevent the Rays of the Sun from Passing through Window or other Glass.—Pound gum tragacanth into powder, and put it to dissolve for twenty-four hours in whites of eggs, well beaten. Lay a coat of this on your glass with a soft brush, and let it dry.

Cleansing Feathers of their Animal Oil.—The following receipt gained a premium from the Society of Arts: take for every gallon of clean water one pound of quick-lime; mix them well together, and when the undissolved lime is precipitated in fine powder, pour off the clean lime-water for use. Put the feathers to be cleaned in another tub, and add to them a quantity of the clean lime-water, sufficient to cover them about three inches, when well immersed and stirred about therein. The feathers, when thoroughly moistened, will sink down, and should remain in the lime-water three or four days; after which, the foul liquor should be separated from them, by laying them in a sieve. The feathers should be afterwards well washed in clean water, and dried upon nets, the meshes of which may be about the fineness of cabbage-nets. The feathers must be, from time to time, shaken on the nets, and, as they get dry, will fall through the meshes, and are to be collected for use. The admission of air will be serviceable in drying. The process will be completed in three weeks; and after being thus prepared, the feathers will only require to be beaten to get rid of the dust.

Ringworm.—The head to be washed twice a day with soft soap and warm soft water; when dried, the places to be rubbed with a piece of linen rag dipped in ammonia from gas-tar; the patient should take a little sulphur and molasses, or some other gentle aperient, every morning; brushes and combs should be washed every day, and the ammonia kept tightly corked.

Directions for Making Good Sausages.—Take thirty pounds of meat, chopped fine; eight ounces of fine salt; two and a half ounces of pepper; two tea-cups of sage; and one and a half cup of sweet marjoram, passed through a fine sieve. For the latter, thyme or summer savory can be substituted, if preferred.

To Drive away Cockroaches.—A respectable professional gentleman says he has discovered that spirits of turpentine is an effectual remedy against the depredations of cockroaches. Thus, put a little of it upon the shelves and sides of your book-cases, bureaux, or other furniture, in which they take shelter; which may be done with a feather, and these troublesome insects will soon quit, not only the furniture, but the room. The remedy is simple, and easily obtained by every person who wishes it. It is not unpleasant to the smell, soon evaporates, and does no injury to the furniture or clothing. This is a valuable discovery, if it proves in all cases as our informant assures us it did in his house.

Moths, (to get rid of them.)—Procure shavings of cedar-wood, and inclose in muslin bags, which should be distributed freely among the clothes. Procure shavings of camphor-wood, and inclose in bags. Sprinkle pimento (allspice) berries among the clothes. Sprinkle the clothes with the seeds of the musk-plant. To destroy the eggs when deposited in woolen cloth, etc., use a solution of acetate of potash in spirits of rosemary, fifteen grains to the pint.

To Destroy Slugs.—Slugs are very voracious, and their ravages often do considerable damage, not only to the kitchen garden, but to the flower-beds also. If, now and then, a few slices of turnip be put about the beds, on a summer or autumnal evening, the slugs will congregate thereon, and may be destroyed.

Preserving Eggs.—The several modes recommended for preserving eggs any length of time are not always successful. The egg, to be preserved well, should be kept at a temperature so low that the air and fluids within its shell shall not be brought into a decomposing condition; and, at the same time, the air outside of its shell should be excluded, in order to prevent its action in any way upon the egg. The following mixture was patented several years ago by a Mr. Jayne. He alleged that by means of it he could keep eggs two years. A part of his composition is often made use of—perhaps the whole of it would be better: put into a tub or vessel one bushel of quick-lime, two pounds of salt, half a pound of cream of tartar, and mix the same together, with as much water as will reduce the composition or mixture to that consistence that it will cause an egg put into it to swim with its top just above the liquid; then put and keep the eggs therein.

An Improvement in Making Candles.—Let the wick be steeped in lime-water, in which has also been dissolved a quantity of common nitre or saltpetre. By this means a purer flame and a superior light is obtained. A more perfect combustion is also insured; snuffing is rendered nearly superfluous, as in wax candles; and the candles with wicks thus prepared will not melt and run down.

To Save Expense in Clothing.—Purchase that which is at once decent and the most durable; and wear your garment, despite the frequent changes of fashion, till it becomes too defaced to appear decent; then turn it, and wear it thenceforth as long as it protects the body. A blue coat is as warm after fashion requires a green one as it ever was. A red shawl, in fashion to-day, is as warm as a black one, which fashion requires to-morrow. A few years hence your fame will not depend upon the style, color, or quality of the garments you wore in early life; the width of the brim to your father's hat; or the size and color of your mother's bonnet.

Composition to Make Colored Drawings and Prints Resemble Paintings in Oil.—Take of Canada balsam, one ounce; spirits of turpentine, two ounces; mix them together. Before this composition is applied, the drawing or print should be sized with a solution of isinglass in water, and when dry, apply the varnish with a camel's-hair brush.

A Varnish to Color Baskets.—Take either red, black, or white sealing-wax, whichever color you wish to make; to every two ounces of sealing-wax add one ounce of spirits of wine; pound the wax fine, then sift it through a fine lawn sieve, till you have made it extremely fine; put it into a large phial with the spirits of wine; shake it, let it stand near the fire forty-eight hours, shaking it often; then brush the baskets all over with it; let them dry, and do them over a second time.

To Stain Harps, Violins, or any other Musical Instrument.—*A Crimson Stain.*—Take one pound of ground Brazil and boil it in three quarts of water for an hour; stain it, and add half an ounce of cochineal; boil it again for half an hour gently, and it will be fit for use. If you would have it of the scarlet tint, boil half an ounce of saffron in a quart of water, and pass over the work previous to the red stain. Observe, the work must be very clean, and of fir-wood or good sycamore, without blemish. When varnished it will look very rich.

For a Purple Stain.—Take a pound of chip-logwood, to which put three quarts of water; boil it well for an hour; add four ounces of pearlash and two ounces of indigo pounded, and you will have a good purple.

Blue Stain.—Take a pound of oil of vitriol in a glass bottle, in which put four ounces of indigo, and proceed as before directed in dyeing.

Green Stain.—Take three pints of strong vinegar, to which put four ounces of the best verdigris, ground fine, half an ounce of sap-green, and half an ounce of indigo.

To Polish Mahogany Furniture.—Rub it with cold-drawn linseed oil, and polish by rubbing with a clean, dry cloth, after wiping the oil from the furniture. Do this once a week, and your mahogany tables will be so finely polished that hot water will not injure them. The reason is this—linseed oil hardens when exposed to the air, and when it has filled all the pores of the wood, the surface becomes hard and smooth like glass.

To Clean Paint that is Not Varnished.—Take a flannel and squeeze nearly dry out of warm water, and dip in a little whiting; apply to the paint, and with a little rubbing it will instantly remove grease, smoke, or other soil. Wash with warm water, and rub dry with a soft cloth. It will not injure the most delicate color, and makes it look as well as new; besides, it preserves the paint much longer than if cleaned with soap and water.

To Take Smell from Fresh Paint.—Let tubs of water be placed in the room newly painted, near the wainscot, and an ounce of vitriolic acid put into the water, and in a few days this water will absorb and retain the effluvia from the paint, but the water should be renewed with a fresh supply once or twice; or, to get rid of the smell of oil-paint, plunge a handful of hay into a pailful of water and let it stand in the room newly painted.

Where painted wainscot, or other wood-work, requires cleaning, fuller's-earth will be found cheap and useful; and, on wood not painted, it forms an excellent substitute for soap.

To Extract Paint from Goods.—Saturate the spot with pure spirits of turpentine, and let it remain several hours, then rub it between the hands. It will crumble away without injuring either the color or texture of the article.

The Best Season for Painting Houses.—The outside of buildings should be painted during autumn or winter. Hot weather injures the paint by drying in the oil too quickly; then the paint will easily rub off. But when the paint is laid on during cold weather it hardens in drying and is firmly set.

Hard Cement for Seams.—A very excellent cement for seams in the roofs of houses, or for any other exposed places, is made with white-lead, dry white sand, and as much oil as will make it into the consistency of putty. This cement gets as hard as any stone in the course of a few weeks. The lead forms a kind of flux with the sand; it is excellent for filling up cracks in exposed parts of brick buildings; it is also a good cement for pointing up the joints about chimneys, etc.

Fire and Water Proof Cement.—To half a pint of milk put an equal quantity of vinegar, in order to curdle it; then separate the curd and the whey, and mix the whey with four or five eggs, beating the whole well together. When it is well mixed, add a little quick-lime through the sieve until it has acquired the consistence of paste. With this cement, broken vessels and cracks of all kinds may be mended. It dries quickly, and resists the action of the water as well as of a considerable degree of fire.

To Remove Marks from a Table.—If a whitish mark is left on a table by carelessly setting on a pitcher of boiling water, or a hot dish, pour some lamp oil on the spot, and rub it hard with a soft cloth. Then pour on a little spirits of wine or cologne-water, and rub it dry with another cloth. The white mark will thus disappear and the table look as well as ever.

INKS.—Dr. Ure's Ink.—For one gallon of ink, take one pound of bruised galls, five ounces of gum-arabic, five ounces green vitriol, and one gallon of rain-water. Boil the galls in the water for three hours, adding fresh water to supply that lost in vapor. Let the decoction settle, and turn off the clear liquor; add to it the gum, previously dissolved in a pint of water; dissolve the green vitriol separately in a pint of water, and mix the whole. The above makes a very superior ink, and it can be made in any family at a very trifling cost.

Ink-Powder is formed of the dry ingredients for ink powdered and mixed. Powdered galls, two pounds; powdered green vitriol, one pound; powdered gum, eight ounces. This should be put up into two-ounce packets, each of which will make one pint of ink.

Red Writing-Ink.—Best ground Brazil-wood, four ounces; diluted acetic acid, one pint; alum, half an ounce. Boil them slowly in an enameled vessel for one hour; strain, and add an ounce of gum.

Marking-Ink Without Preparation.—There are several receipts for this ink, but the following of Mr. Redwood is rapidly superseding all the others: dissolve separately one ounce of nitrate of silver, and one and a half ounces of subcarbonate soda (best washing soda) in distilled or rain water. Mix the solutions, and collect and wash the precipitate in a filter; while still moist, rub it up, in a marble or Wedgewood mortar, with three drachms of tartaric acid; add two ounces of distilled water, mix six drachms of white sugar, and ten drachms of powdered gum arabic, half an ounce of archil and water to make up six ounces in measure.

Ink for Zinc Garden-Labels.—Verdigris, one ounce; sal ammoniac, one ounce; lampblack, half an ounce; water, half a pint. Mix in an earthenware mortar, without using a metal spatula. Should be put up in small (one-ounce) bottles for sale.

Directions.—To be shaken before use, and used with a clean *quill* pen, on bright, freshly-cleaned zinc.

Note.—Another kind of ink for zinc is also used, made of chloride of platinum, five grains, dissolved in one ounce of distilled or rain-water; but the first, which is much less expensive, answers perfectly, if used as directed, on clean, bright zinc.

Root-Beer.—A handful each of yellow dock, dandelion, and sarsaparilla roots, sassafras bark, hops, and a little boneset; boil until the strength is extracted. To three gallons of this liquor, after straining, add one quart of molasses, and when cool enough, three yeast-cakes. Let it stand in a warm place eight or ten hours, strain and bottle.

Theological Beer.—To three gallons of water, lukewarm, add a small teaspoonful of each of the oils of spruce, sassafras, and winter-green, one quart of molasses, and three yeast-cakes. Proceed as with the former. It will fill fifteen bottles.

Family Soda Water.—Three pounds of sugar, and three ounces tartaric acid; pour on them one quart of boiling water. Beat together the whites of three eggs; three tablespoonfuls of flour; which stir into the mixture when cool enough; boil for five minutes; do not skim but stir in the skum when it rises. One bottle extract of lemon. Bottle for future use. To use, take two tablespoonfuls to a tumbler of cold water, and half a teaspoonful of soda.

To Prevent the Smoking of a Lamp.—Soak the wick in strong vinegar, and dry it well before you use it; it will then burn both sweet and pleasant, and give much satisfaction for the trifling trouble taken in preparing it.

Remedy for Blistered Feet from Long Walking.—Rub the feet at going to bed with spirits mixed with tallow dropped from a lighted candle into the palm of the hand.

Phosphorus Paste for Destroying Rats and Mice.—Melt one pound of lard, with a very gentle heat, in a bottle or glass flask plunged into warm water; then add half an ounce of phosphorus, and one pint of proof spirit; cork the bottle securely, and as it cools shake it frequently, so as to mix the phosphorus uniformly; when cold, pour off the spirit (which may be preserved for the same purpose), and thicken the mixture with flour. Small portions of this mixture may be placed near the rat-holes, and being luminous in the dark, it attracts them, is eaten greedily, and is certainly fatal. N. B.—There is no danger of fire from its use.

An Easy Method of Exterminating Rats and Mice.—Mix powdered nux vomica with oat-meal, and lay it in their haunts, observing proper precaution to prevent accidents. Another method is, to mix oat-meal with a little powdered phosphorus.

Cure for Burns.—Of all applications for a burn we believe that there are none equal to a simple covering of common *wheat flour*. This is always at hand; and while it requires no skill in using, it produces most astonishing effects. The moisture produced upon the surface of a slight or deep burn is at once absorbed by the flour and forms a paste which shuts out the air. As long as the fluid matters continue flowing, they are absorbed and prevented from producing irritation, as they would do if kept from passing off by oily or resinous applications, while the greater the amount of those absorbed by the flour, the thicker the protective covering. Another advantage of the flour covering is, that next to the surface it is kept moist and flexible. It can also be readily washed off, without further irritation in removing. It may occasionally be washed off very carefully, when it has become matted and dry, and a new covering be sprinkled on.

Corns.—Boil a potato in its skin, and after it is boiled take the skin and put the inside of it to the corn, and leave it on for about twelve hours; at the end of that period the corn will be much better. The above useful and simple receipt has been tried and found effectual. Take two ounces of gum ammoniac, two ounces of yellow wax, and six drachms of verdigris, melt them together, and spread the composition on soft leather. Cut away as much of the corn as you can, then apply the plaster, and renew it every fortnight till the corn is away. Take white pine turpentine, spread a plaster, apply it to the corn, and let it stay on till it comes off of itself. Repeat this three times. It is also good for wounds.

Method of Curing the Stings of Bees and Wasps.—The sting of a bee is generally more virulent than that of a wasp, and with some people attended with very violent effects. The sting of a bee is barbed at the end, and consequently always left in the wound; that of a wasp is pointed only, so that they can sting more than once, which a bee cannot do. When any person is stung by a bee, let the sting, in the first place, be instantly pulled out, for the longer it remains in the wound the deeper it will pierce, owing to its peculiar form, and emit more of the poison. The sting is hollow, and the poison flows through it, which is the sole cause of the pain and inflammation. The pulling out of the sting should be done carefully and with a steady hand, for if any part of it breaks in, all remedies then, in a great measure, will be ineffectual. When the sting is extracted, suck the wounded part, if possible, and very little inflammation, if any, will ensue. If hartshorn drops are immediately afterward rubbed on the part the cure will be more complete. All notions of the efficacy of sweet oil, bruised parsley, burnet, tobacco, etc., appear, on various trials, to be totally groundless. On some people the sting of bees and wasps has no effect; it is therefore of little consequence what remedy they apply to the wound. However, the effect of stings greatly depends on the habit of body a person is of; at one time a sting shall take little or no effect though no remedy is used, which at another time will be very virulent on the same person. We have had occasion to test this remedy several times, and can safely avouch its efficacy. The exposure to which persons are subjected during the hot summer months will no doubt render this advice very useful; its very simplicity making it more acceptable.

How to Get Sleep.—How to get sleep is to many persons a matter of high importance. Nervous persons, who are troubled with wakefulness and excitability, usually have a strong tendency of blood on the brain, with cold extremities. The pressure of the blood on the brain keeps it in a stimulated or wakeful state, and the pulsations in the head are often painful. Let such rise and chafe the body and extremities with a brush or towel, or rub smartly with the hands to promote circulation, and withdraw the excessive amount of blood from the brain, and they will fall asleep in a few moments. A cold bath, or a sponge-bath and rubbing, or a good run, or a rapid walk in the open air, or going up or down stairs a few times just before retiring, will aid in equalizing circulation and promoting sleep. These rules are simple and easy of application in castle or cabin, and may minister to the comfort of thousands who would freely expend money for an anodyne to promote "Nature's sweet restorer, balmy sleep."

Charcoal.—All sorts of glass vessels and other utensils may be purified from long-retained smells of every kind, in the easiest and most perfect manner, by rinsing them out well with charcoal-powder, after the grosser impurities have been scoured off with sand and potash. Rubbing the teeth, and washing out the mouth with fine charcoal-powder, will render the teeth beautifully white, and the breath perfectly sweet, where an offensive breath has been owing to a scorbutic disposition of the gums. Putrid water is immediately deprived of its bad smell by charcoal. When meat, fish, etc., from intense heat, or long keeping, are likely to pass into a state of corruption, a simple and pure mode of keeping them sound and healthful is, by putting a few pieces of charcoal, each the size of an egg, into the pot or sauce-pan wherein the fish or flesh is to be boiled. Among others, an experiment of this kind was tried upon a turbot, which appeared to be too far gone to be eatable; the cook, as advised, put three or four pieces of charcoal, each the size of an egg, under the strainer, in the fish-kettle; after boiling the proper time, the turbot came to the table sweet and firm.

To Preserve Milk.—Provide bottles, which must be perfectly clean, sweet, and dry; draw the milk from the cow into the bottles, and as they are filled, immediately cork them well up, and fasten the corks with pack-thread or wire. Then spread a little straw at the bottom of a boiler, on which place bottles with straw between them, until the boiler contains a sufficient quantity. Fill it up with cold water; heat the water, and as soon as it begins to boil, draw the fire, and let the whole gradually cool. When quite cold, take out the bottles and pack them in saw-dust, in hampers, and stow them in the coolest part of the house. Milk preserved in this manner, and allowed to remain even eighteen months in the bottles, will be as sweet as when first milked from the cow.

For the Cure of Felon.—Take a piece of rock-salt, about the size of a butternut or English walnut, and wrap it up closely in a green cabbage-leaf, but if not to be had, in a piece of brown paper, well moistened with water. Lay it on embers, and cover it up so as to roast; when it has been in about twenty minutes, take it out and powder it as finely as possible. Then take some hard soap, and mix the powdered salt with it, so as to make it a salve. If the soap should contain but little turpentine, none need be added. Apply the salve to the part affected, and in a short time it will totally destroy it, and remove the pain.

Another.—As soon as the pain is felt, take the thin white skin of an egg, which is found inside of the shell; put it round the end of the finger or thumb affected, and keep it there until the pain subsides. As soon as the skin becomes dry it will be very painful, and likely to continue for half an hour or more, but be not alarmed. If it grows painful, bear it; it will be of short duration, compared to what the disease would be. A cure will be certain.

To Make Clothes Water-Proof.—Take thirty ounces of alum to thirty quarts of water; then dissolve in another vessel thirty ounces of acetate of lead in an equal quantity of water; mix the two liquids, turn off the liquid which retains in solution the acetate of alum, and plunge into it the fabric desired to be made impermeable to water or other fluid.

The cloth should be thoroughly saturated with the fluid, when it should be dried. Goods rendered impermeable by this process retain no unpleasant odor after exposure for a time to the atmosphere.

To Clean Glass.—Common newspaper is one of the best articles. The chemical effect of some ingredient in the printing ink gives a beautiful polish. Slightly moisten a piece of paper, roll it up and rub he glass; take a dry soft piece and repeat the process. No lint will remain, as in the use of cloth.

Family Tool-Chests.—Much inconvenience and considerable expense might be saved, if it was the general custom to keep in every house certain tools for the purpose of performing at home what are called small jobs, instead of being always obliged to send for a mechanic, and pay him for executing little things that, in most cases, could be sufficiently well done by a man or boy belonging to the family, provided that the proper instruments were at hand.

The cost of these articles is very trifling, and the advantages of having them always in the house are far beyond the expense.

For instance, there should be an axe, a hatchet, a saw (a large wood-saw, also, with a buck or stand, if wood is burned,) a claw-hammer, a mallet, two gimlets, of different sizes, two screw-drivers, a chisel, a small plane, one or two jack-knives, a pair of large scissors or shears, and a carpet-fork or stretcher.

Also an assortment of nails of various sizes, from large spikes down to small tacks, not forgetting brass-headed nails, some larger and some smaller.

Screws, likewise, will be found very convenient, and hooks on which to hang things.

The nails and screws should be kept in a wooden box, made with divisions to separate the various sorts, for it is very troublesome to have them mixed.

And let care be taken to keep up the supply, lest it should run out unexpectedly, and the deficiency cause delay and inconvenience at a time when their use is wanted.

It is well to have somewhere in the lower part of the house a deep, light closet, appropriated entirely to tools and things of equal utility, for executing promptly such little repairs as convenience may require, without the delay or expense of procuring an artisan. This closet should have at least one large shelf, and that about three feet from the floor.

Beneath this shelf may be a deep drawer, divided into two compartments. This drawer may contain cakes of glue, pieces of chalk, and balls of twine of different size and quality.

There may be shelves at the sides of the closet for glue-pots, paste-pots, and brushes, pots for black, white, green, and red paints, cans of painting oil, paint-brushes, etc.

Against the wall, above the large shelf, let the tools be suspended, or laid across nails or hooks of proper size to support them.

This is much better than keeping them in a box, where they may be injured by rubbing against each other, and the hand may be hurt in feeling among them to find the thing that is wanted.

But when hung up against the back wall of the closet, of course each tool can be seen at a glance.

We have been shown an excellent and simple contrivance for designating the exact places allotted to all these articles in a very complete tool-closet.

On the closet wall, directly under the large nails that support the tools, is drawn, with a small brush dipped in black paint or ink, an outline representation of the tool or instrument belonging to that particular place.

For instance, under each saw is sketched the outline of that saw, under each gimlet a sketch of that gimlet; under the screw-drivers are slight drawings of screw-drivers.

So that, when bringing back any tool that has been taken away for use, the exact spot to which it belongs can be found in a moment; and all confusion in putting them up and finding them again is thus prevented.

To Preserve Hams in Summer.—Before hot weather commences, cut up hams and shoulders, and fully cook them, so that when warmed they are at any time ready for the table; cover the bottom of a stone jar with the gravy, then put in a layer of ham, covering it with gravy, and thus proceed with alternate layers of ham and gravy. To form gravy sufficient to cover the ham, considerable lard should be used in cooking it, that it may thus be seasoned, and not simply melted and poured upon it, as some recommend. Hams thus prepared are as good the second year as the first. Sausages may be preserved in a similar manner.

To Keep Grapes Fresh.—Away with your saw-dust, cotton, sealing-wax, etc. Pick your grapes carefully without bruising, and put them into quarter or half barrels, the bottoms and sides of which are bored full of holes; place these casks in a cool, well-ventilated place, but where no currents of air can pass over them, and where they will not freeze. Fully matured and carefully picked grapes thus stored will be fresh in March.

Bird-Lime.—Take any quantity of linseed oil, say half a pint; put it into an old pot, or any vessel that will stand the fire without breaking; the vessel must not be more than one-third full; put it on a slow fire, and stir it occasionally until it thickens as much as required; this will be known by cooling the stick in water, and trying it with the fingers. It is best to make it rather harder than for use. Then pour it into cold water. It can be brought back to the consistency required with a little Archangel tar.

Liquid Glue.—Dissolve one ounce of borax in a pint of boiling water; add two ounces of shellac, and boil in a covered vessel until the lac is dissolved. This forms a very useful and cheap cement; it answers well for pasting labels on tin, and withstands damp much better than the common glue. The liquid glue made by dissolving shellac in naptha is dearer, soon dries up, and has an unpleasant smell.

Best Blacking for Boots and Shoes.—Ivory-black, one and a half ounce; treacle, one and a half ounce; sperm oil, three drachms; strong oil of vitriol, three drachms; common vinegar, half a pint. Mix the ivory-black, treacle, and vinegar together, then mix the sperm oil and oil of vitriol separately, and add them to the other mixture.

To Clean Hair-Brushes.—As hot water and soap very soon soften the hairs, and rubbing completes their destruction, use soda, dissolved in cold water, instead; soda having an affinity for grease, it cleans the brush with little friction. Do not set them near the fire, nor in the sun, to dry, but after shaking them well, set them on the point of the handle in a shady place.

Scurf in the Head.—A simple and effectual remedy: into a pint of water drop a lump of fresh quick-lime, the size of a walnut; let it stand all night, then pour the water off clear from the sediment or deposit; add a quarter of a pint of the best vinegar, and wash the head with the mixture. It is perfectly harmless; only wet the roots of the hair.

A Very Good Microscope may be made by dropping a little balsam of fir, or Canada balsam, on the under side of a thin piece of glass. It may be used both before and after it is dry.

Disinfecting Liquid.—In a wine-bottle of cold water, dissolve two ounces of acetate of lead (sugar of lead); and then add two (fluid) ounces of strong nitric acid (aquafortis.) Shake the mixture, and it will be ready for use. A very small quantity of the liquid, in its strongest form, should be used for cleansing all kinds of chamber utensils. For removing offensive odors, clean cloths, thoroughly moistened with the liquid, diluted with eight or ten parts of water, should be suspended at various parts of the room. In this case the offensive and deleterious gases are neutralized by chemical action. Fumigation in the usual way is only the substitution of one odor for another. In using the above, or any other disinfectent, let it never be forgotten that *fresh air*—and plenty of it—is cheaper and more effective than any other material.

To Dry Sweet Corn for Winter Use.—Pick the corn when fit for present use, clean of husks and silk; put it into *hot* water to scald the milk; do not let it boil, but remain just long enough to cook the milk, and which very much facilitates the drying. Cut the corn from the cob, and dry it in the sun on papers or cloths. One bright day will place it out of danger, though, before being put up, it should be very thoroughly dried.

A Simple Cure for the Croup.—The *Journal of Health* says, when a child is taken with croup, instantly apply cold water, ice-water, if possible, suddenly and freely to the neck and chest with a sponge. The breathing will almost instantly be relieved. So soon as possible, let the sufferer drink as much as it can; then wipe it dry, cover it warm, and soon a quiet slumber will relieve all anxiety.

To Prevent the Spreading of Contagion.—It cannot be too widely known, that nitrous acid possesses the properties of destroying the contagion of typhus fevers, and other malignant diseases. By the following simple process the gas may be procured with but little expense and trouble. Place a little saltpetre on a saucer, and pour on it as much oil of vitriol as will just cover it; a copious discharge of acid gas will instantly take place. The quantity may be regulated by the ingredients. This is very important in preserving health, and preventing the spread of contagion.

Scald Head in Infants.—This complaint begins in brownish spots on the head, and in a few days forms a scab and discharges a thick, gluey matter that sticks upon the hair. The sores gradually increase, until the whole head is covered with a scab, discharging this matter, which is very offensive. The hair is to be cut off as close as possible, and the head washed every night and morning with lime-water. This is easily prepared by slacking a piece of quick-lime, of the size of a hen's egg, in a quart of water, and when settled, it is to be put into a bottle and corked for use.

Cure for the Piles.—The following simple application will certainly cure this most distressing complaint. It has been tried by many and found successful. Take three ounces of pulverized alum and place in a belt made of cotton drilling, two inches in width, and wear the belt around the body above the loins. It should be worn next the skin. Its operation is slow but certain. Sweet oil is an excellent application for the parts affected. Carrot poultices give great relief.

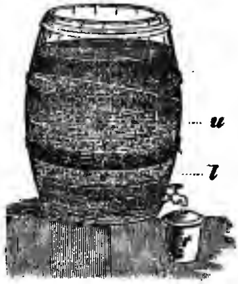


Fig. 1.*

Fig. 2.*

STRAINING OR FILTERING WATER.—The following simple and efficient method of straining and filtering water, and for which we are indebted to the "American Agriculturist," we earnestly commend to all who are building cisterns, or who would have sweet, pure, and wholesome water.

This can be done almost perfectly by passing it through a few layers of closely-woven flannel, or even cotton cloth. But the operation would be tedious if performed daily with all water used for drinking and cooking. We present two very convenient and easily-constructed water-filterers, the first of which we have used for years.

Fig. 1 is a large barrel or cask. A lower false-head, *l*, is fitted in, say six or eight inches from the bottom. This is perforated with very small gimlet-holes, over which is placed a layer, *s*, of coarse, clean sand, previously washed upon a fine sieve, to remove the finer particles which would otherwise wash through the gimlet-holes. Over this sand is a layer, *c*, of broken charcoal; above the charcoal is another layer of the prepared sand, upon the top of which is another false-head, *u*. The space above is filled with water, *w*, which gradually filters down into the vacant space, *p*, entirely free from its impurities. We should add,

* "American Agriculturist," vol. xvii., page 89.

that when it is impracticable to wash the sand, a white flannel cloth may be placed upon the false-head, *l*, under the sand. Upon the right of the filter-barrel, a glazed stone-ware jar, *r*, holding one or two pailfuls, is set its whole depth into the ground or cement of the cellar-bottom. This keeps cool at all times. When water is desired for use, it is dipped out of the jar, and the stop-cock is then turned to fill it up again, that the water may be cooled before it is needed. Such an apparatus can be fitted up in a few hours, and it serves admirably for purifying water, however brackish or bad previously. Dark-colored swamp-water, on passing through it, comes out clear, limpid, and agreeable. Try it, you who are so unfortunate as not to have good well-water. The upper layer of sand will need occasional renewing, and where much bad water is passed through, it will be well to frequently renew both sand and charcoal.

Fig. 2 represents a still better filtering apparatus, though one not quite so easily constructed. *B* is a board fitted lightly from top to bottom, say six inches to the right of the middle, a half-circle, *o*, is cut out at the bottom of the board, *B*. Another board, *c*, say fifteen inches high, is fitted in six inches to the left of the middle. A bottom-piece, pierced with very small gimlet-holes, is placed below the two upright boards, say three inches above the bottom of the cask. Upon this are placed layers of sand, *s*, *s*, and coal, *c*, just as described in fig. 1, with a punctured board over them. Water, *m*, is then poured in, and it passes through the opening, *o*, *up* through the sand and coal and into *n*. Such an apparatus will last a long time, since the sediment, separated from the impure water, will fall down, leaving the filter free; while in fig. 1 this sediment would require frequent removal. A stone-ware side vessel for cooling the water may be provided for fig. 2, the same as in fig. 1.

Fig. 2 illustrates an excellent mode of constructing cisterns to have the water always *pure*. The division may be made of brick-work laid in water-lime (hydraulic cement). The filtering layers need occupy but a small space in the center on one side of the division-cell. The water from the roof, conducted into *m*, will filter through into *n*, gradually, and except immediately after a heavy fall of rain, or after large drafts on the purified portion, the water will stand upon a level in both compartments. We hardly need dilate upon the advantages of such an arrangement. Rain-water usually washes down considerable quantities of dust lodged upon the roofs of buildings. The filtered water will be found admirable for drinking, cooking, and for washing and rinsing clothes *clean*.

How to Dig Wells in Quick-Sand.—As soon as the water is reached, have ready a circle of good plank, sufficiently large on the outside for the extreme diameter of the wall—the inner circle to be about four feet, so that a man can work in it. This circle should be made double by pinning sections together. Lay this circle evenly upon the quick-sand, and commence upon it a wall of hard brick laid in hydraulic cement, and so as to be water-tight; the bricks may be laid with the ends inward, the crevices filled with small stones or broken brick mixed with the cement. This wall should be carried up four or five feet—the well-hole, as before stated, to be at least four feet in diameter. Let this wall stand and fix for four or five days if the flow of water will permit; a man then dips out the quick-sand, and the wall settles as the sand is taken out. The outside of the wall should of course be free from contact with the earth, so that it can settle freely. In this way, the well can be settled to any desired depth, and the wall raised as the work progresses. One foot of clean gravel should be pounded upon the bottom of the well, and the work is effectually done.

To Clean Teeth.—Take of good soft water, one quart; juice of lemon, two ounces; burnt alum, six grains; common salt, six grains. Mix; boil them a minute in a cup; then strain and bottle for use; rub the teeth with a small bit of sponge tied to a stick once a week.

To Prevent Wounds from Mortifying.—Sprinkle sugar on them. The Turks wash fresh wounds with wine, and sprinkle sugar on them. Obstinate ulcers may be cured with sugar dissolved in a strong decoction of walnut leaves.

A Simple Cure for Dysentery.—Take some butter off the churn, immediately after being churned, just as it is, without being salted or washed; clarify it over the fire like honey. Skim off all the milky particles when melted over a clear fire. Let the patient (if an adult) take two tablespoonfuls of the clarified remainder, twice or three times within the day. This has never failed to effect a cure, and in many cases it has been almost instantaneous.

Extract of Arnica for Bruises, Sprains, Burns, etc.—Take one ounce of arnica flowers, dried—that prepared by the Shakers is considered the best—and put them in a wide-mouthed bottle; pour just enough scalding water over them to moisten them, and afterward about a pint or a pint and a half of spirits of wine. In case of a burn or bruise, etc., wet a cloth in the arnica, and lay it on the part affected. Renew the application occasionally, and the pain will soon be removed.

To Destroy Ants.—Dissolve a teaspoon of cobalt or common fly-poison in three tablespoons of warm water, and "sweeten to their taste;" place it where ants frequent; and, after taking one supper, they will never take another; and, after a short time, if thus fed, none will be left "to tell the tale."

A Good Adhesive Plaster.—Three ounces of white rosin; four ounces of bees'-wax; four ounces of mutton-tallow; melt and mix well. Let it cool partially; then add to it one ounce of spirits of turpentine, one ounce of British oil, half a bottle of Harlem oil, and one ounce of balsam of fir; work like shoemakers' wax.

PREPARATIONS FOR THE SICK.—Egg-Gruel.—Boil a pint of new milk; beat two new-laid eggs to a light froth, and pour in while the milk boils; stir them together thoroughly, but do not let them boil; sweeten it with the best of loaf-sugar, and grate in a whole nutmeg; add a little salt, if you like it. Drink half of it while it is warm, and the other half in two hours. It is said to be good for dysentery, as well as nourishing.

Apple-Water.—Take one tart apple of ordinary size, well baked; let it be well mashed; pour on it one pint of boiling water; beat them well together; let it stand to cool, and strain it off for use. Add loaf-sugar, if the patient desire it.

Arrow-Root.—Put two teaspoonfuls of the powder into a basin; mix them smooth with a few teaspoonfuls of cold water, and let another person pour boiling water over the mixture while you continue to stir it, until it forms a kind of starchy-looking substance. Thus prepared, it may be used in the same manner as gruel. It is well adapted for the food of infants, because it is less liable to ferment than either gruel or barley-water; and, for the same reason, it is the best fluid nourishment for those who are afflicted with indigestion. A little milk or wine may be added, to improve the flavor.

A Nourishing Jelly.—Put into a stone jar or jug a set of calves'-feet, cut in pieces, a quart of milk, five pints of water, a little mace, half an ounce of isinglass, and a handful of hartshorn shavings. Tie some brown paper over the jug, and put it into the oven with household bread. When done, strain it through a sieve; and when cold, take off the fat. Some of it may occasionally be warmed up with wine and sugar. It is good taken as broth, with herbs.

Beef-Tea.—Cut a pound of lean beef in thin slices; put it into a quart and half a pint of cold water; set it over a gentle fire, where it will become gradually warm; when the scum rises, let it continue to simmer gently for about an hour; then strain it through a sieve or a napkin, let it stand ten minutes to settle, and then pour off the clear tea. This is one of the common restoratives given to persons who are recovering from sickness.

Toast and Water.—Toast thin slices of bread on both sides carefully; then pour cold water over the bread, and cover it tight for one hour; or use boiling water, and let it cool.

Waters for Cooling Draughts of Preserved or Fresh Fruits—Apple-Water, Lemon-Water, etc.—Pour boiling water on the preserved or fresh fruits, sliced; or squeeze out the juice, boil it with sugar, and add water.

Water-Gruel.—Mix two tablespoonfuls of Indian or oat-meal with three tablespoonfuls of water. Have ready a pint and a half of boiling water in a sauce-pan or skillet, perfectly clean; pour this by degrees into the mixture in the bowl; then return it back into the skillet, and place it on the fire to boil. Stir it, and let it boil half an hour. Skim it, and season it with a little salt. If it is admissible, a little sugar and nutmeg renders it more palatable. Also, if milk is not forbidden, a small tea-cupful added to a pint of gruel, and boiled up once, makes a nice dish for an invalid.

Milk-Porridge.—This is made nearly in the same way as gruel, only using half flour and half meal, and half milk instead of water. It should be cooked before the milk is added, and only boiled up once afterward.

Wine-Whey.—Take half a pint of new milk; put it on the fire, and the moment it boils, pour in that instant two glasses of wine and a tea-spoonful of powdered sugar, previously mixed. The curd will soon form, and, after it has boiled, set it aside until the curd settles. Pour the whey off, and add a pint of boiling water, and loaf-sugar to sweeten to the taste. This may be drank in typhus and other fevers, debility, etc.

Chicken, Beef, or Veal Broth.—This is made by cutting up the chicken, or the lean of veal or beef, and putting in two spoonfuls of washed rice, and boiling until tender. It may be used, if needed in haste, after boiling in less water about fifteen minutes, then filling it up and finishing. It should be put by in a bowl or pitcher, covered, to keep for use. Warm it, and add crumbs of crackers or bread a day or two old, with a little salt, and there is nothing more palatable for the sick.

Hot Lemonade.—Cut up the whole of a lemon, rind and all, add one teacupful of white sugar, and pour on boiling water. This is good for colds, and is a pleasant drink for the sick.

Rice-Gruel.—Take one spoonful of rice, a pint and a half of water, a stick of cinnamon or lemon-peel; mix, and boil it soft, and add a pint of new milk; strain it, and season it with a little salt. If you make it of rice flour, mix one spoonful with a little cold water smoothly, and stir it into a quart of boiling water. Let it boil five or six minutes, stirring it constantly. Season it with salt, nutmeg, and sugar, and, if admissible, a little butter. If the patient bears stimulants, a little wine may be added.

Egg-Cream.—To the yolks of three eggs, and a dessertspoonful of good new milk or cream, add two drops of oil of cinnamon. This is a very nourishing mixture. The oil of cinnamon is cordial and tonic, and the above has been recommended in lung complaints, where respiration has been attended with pain, and a dry cough, especially after eating or exercise. It is also excellent in cases of hectic toward the evening, and of profuse night-sweats.

Caudle.—Make a fine, smooth gruel of half grits; when boiled, strain it; stir it at times till cold; when wanted for use, add sugar, wine, and lemon-peel, with some nutmeg, according to taste; you may add, if you please, besides the wine, a spoonful of brandy or lemon-juice.

POISONS AND THEIR ANTIDOTES.—First ascertain, if possible, what poison the person has taken, and then a resort may be had to the following remedies, if on hand, while a person goes for the doctor. It should be remembered that the ordinary calcined magnesia, mixed in water, is considered a certain antidote to numerous poisons of metallic origin, such as arsenic, corrosive sublimate, sulphate of zinc, etc.

Acids.—Such are oil of vitriol, aqua fortis, oxalic acid. These cause great heat, and sensation of burning pain, from the mouth down to the stomach. Remedies—magnesia, soda, pearlash, soap dissolved in water, or flaxseed-tea; then use a stomach-pump, or emetics.

Alcohol.—First cleanse the stomach by an emetic, then dash cold water on the head, and give ammonia (spirits of hartshorn).

Alkalies.—Such are caustic potash, caustic soda, and volatile alkali. Take vinegar or lime-juice. Afterward large quantities of sugar and water.

Ammonia.—Remedy, lemon-juice or vinegar; afterward milk and water, or flaxseed-tea.

Arsenic.—The symptoms are the same in mercurial poisons. Remedies—in the first place, evacuate the stomach; then give the white of eggs, lime-water, or chalk and water, charcoal, and the preparations of iron, particularly hydrate.

Belladonna, or Night-Henbane.—Give emetics, and then plenty of vinegar and water, or lemonade.

Charcoal.—In poisons by carbonic gas, remove the patient to open air, dash cold water on the head and body, and stimulate the nostrils and lungs by hartshorn, at the same time rubbing the chest briskly.

Corrosive Sublimate.—Constriction, with great pain in the throat, stomach, and bowels. Give white of eggs freshly mixed with water; or give wheat flour and water, or soap and water, freely.

Creosote.—White of eggs, and the emetics.

Lead.—Sugar of lead, extract of saturn, white lead, litharge, minium. A sweet, astringent taste in the mouth, constriction of the throat, pain in the stomach, bloody vomiting, etc. Dissolve a handful of Epsom or Glauber salts in a pint of water, and give it at once; when it has vomited him, use sweetened water. If the symptoms continue, act as directed for acids.

Mushrooms.—Give emetics, and then plenty of vinegar and water, with a dose of ether, if handy.

Nitrate of Silver (Lunar Caustic).—Give a strong solution of common salt, and then emetics.

Nitrate of Potash, or Saltpetre.—Give emetics, then copious draughts of flaxseed-tea, milk and water, and other soothing drinks.

Opium, or Laudanum.—Stupor, inclination to sleep, delirium, convulsions. First give a strong emetic of mustard and water, then strong coffee and acid drinks; dash cold water on the head.

Oxalic Acid.—Frequently mistaken for Epsom salts. Remedies, chalk, magnesia, or soap and water, freely; then emetics.

Prussic Acid.—When there is time, administer chlorine, in the shape of soda or lime; hot brandy and water, hartshorn, and turpentine are also useful.

Snake-Bites, etc.—Apply immediately strong hartshorn, and take it internally; also, give sweet oil and stimulants freely. Apply a ligature tight above the part bitten, and then apply a cupping-glass.

Stings from Bees.—In stings from bees and other insects, bathe with salt and vinegar, or sal-ammoniac and vinegar.

Tartar Emetic.—Give large doses of tea made of galls, Peruvian bark, or white oak bark.

Tobacco, Hemlock, Nightshade, Spurred-Rye, etc.—An emetic, as directed for opium. If the poison has been swallowed some time, purge with castor-oil. After vomiting and purging, if still drowsy, bleed, and give vinegar and water.

White Vitriol.—Give the patient plenty of milk and water. In almost all cases of poisoning emetics are highly useful; and of these, one of the very best, because most prompt and ready, is the common mustard flour or powder, a spoonful of which, stirred up in warm water, may be given every five or ten minutes until free vomiting can be obtained.

Emetics and warm, demulcent drinks, such as milk and water, flaxseed, or slippery-elm tea, chalk-water, etc., should be administered without delay. The subsequent management of the case will of course be left to a physician.

When poisoned by dogwood, ivy, or swamp sumac, dissolve a quarter of an ounce of copperas (sulphate of iron) in a pint of water, and bathe the part affected.

ACCIDENTS.—*Always send off for a surgeon immediately an accident occurs, but treat as directed until he arrives.*

Burns.—If the skin is much injured, spread some linen pretty thickly with chalk ointment, and lay over the part, and give the patient some brandy and water if much exhausted; then send for a medical man. If not much injured and very painful, use the same ointment, or apply carded cotton dipped in lime-water and linseed oil. If you please you may lay cloths dipped in ether over the parts, or cold lotions.

Scalds.—Treat the same as burns, or cover with scraped raw potato; but the chalk ointment is the best. In the absence of all these, cover the parts with treacle, and dust on plenty of flour.

Body in Flames.—Lay the person down on the floor of the room and throw the table-cloth, rug, or other large cloth over him, and roll him on the floor.

Dirt in the Eye.—Place your fore-finger upon the cheek-bone, having the patient before you; then draw up the finger and you will probably be able to remove the dirt; but if this will not enable you to get at it, repeat this operation while you have a netting-needle or bodkin placed over the eyelid; this will turn it inside out, and enable you to remove the sand, or eyelash, etc., with the corner of a fine silk handkerchief. As soon as the substance is removed, bathe the eye with cold water and exclude the light for a day. If the inflammation is severe, take a purgative and use a refrigerant lotion.

Lime in the Eye.—Syringe it well with warm vinegar and water (one ounce to eight ounces of water); take a purgative and exclude light.

Iron or Steel Spiculæ in the Eye.—This occurs while turning iron or steel in a lathe. Drop a solution of sulphate of copper (from one to three grains of the salt to one ounce of water) into the eye, or keep the eye open in a wineglassful of the solution. Take a purgative, bathe with cold lotion, and exclude light to keep down inflammation.

Dislocated Thumb.—This is frequently produced by a fall. Make a clove-hitch, by passing two loops of cord over the thumb, placing a piece of rag under the cord to prevent it cutting the thumb; then pull in the same line as the thumb. Afterward apply a cold lotion.

Cuts and Wounds.—Cut thin strips of sticking-plaster, and bring the parts together; or if large and deep, cut two broad pieces so as to look like the teeth of a comb, and place one on each side of the wound, which must be cleaned previously. These pieces must be arranged so that they shall interlace one another; then by laying hold of the pieces on the right-hand side with one hand, and those on the other side with the other hand, and pulling them from one another, the edges of the wound are brought together, and without any difficulty.

Ordinary Cuts are dressed by thin strips applied by pressing down the plaster on one side of the wound, and keeping it there and pulling in the opposite direction; then suddenly depressing the hand when the edges of the wound are brought together.

Contusions.—When they are very severe, lay a cloth over the part, and suspend a basin over it filled with cold lotion. Put a piece of cotton into the basin, so that it shall allow the lotion to drop on the cloth, and thus keep it always wet.

Hemorrhage, when caused by an artery being divided or torn, may be known by the blood *jumping* out of the wound, and being of a bright scarlet color. If a vein is injured, the blood is darker, and flows continuously. To stop the latter, apply pressure by means of a compress and bandage. To arrest arterial bleeding, get a piece of wood (part of a mop-handle will do), and tie a piece of tape to one end of it; then tie a piece of tape loosely over the arm, and pass the other end of the wood under it; twist the stick round and round until the tape compresses the arm sufficiently to arrest the bleeding, and then confine the other end by tying the string round the arm. If the bleeding is very obstinate, and it occurs in the *arm*, place a cork underneath the string, on the inside of the fleshy part, where the artery may be felt beating by any one; if in the *leg*, place a cork in the direction of a line drawn from the inner part of the knee a little to the outside of the groin. It is an excellent thing to accustom yourself to find out the position of these arteries, or, indeed, any that are superficial, and to explain to every one in your house where they are, and how to stop bleeding. If a stick cannot be got, take a handkerchief, make a cord bandage of it, and tie a knot in the middle; the knot acts as a compress, and should be placed over the artery, while the two ends are to be tied around the thumb. Observe *always to place the ligature between the wound and the heart.* Putting your finger into a bleeding wound, and making pressure until a surgeon arrives, will generally stop violent bleeding.

Bleeding from the Nose, from whatever cause, may generally be stopped by putting a plug of lint into the nostrils; if this does not do, apply a cold lotion to the forehead, raise the head, and place both arms over the head, so that it will rest on both hands; dip the lint plug, *slightly moistened*, into some powdered gum-arabic, and plug the nostrils again; or dip the plug into equal parts of powdered gum-arabic and alum, and plug the nose. If the bowels are confined, take a purgative.

Violent Shocks will sometimes stun a person, and he will remain unconscious. Untie strings, collars, etc.; loosen any thing that is tight and interferes with the breathing; raise the head; see if there is bleeding from any part; apply smelling-salts to the nose, and hot bottles to the feet.

In Concussion, the surface of the body is cold and pale, and the pulse weak and small, the breathing slow and *gentle*, and the pupil of the eye generally contracted or small. You can get an answer by speaking loud, so as to arouse the patient. Give a little brandy and water, keep the place quiet, apply warmth, and do not raise the head too high. If you tickle the feet, the patient feels it.

In Compression of the Brain, from any cause, such as apoplexy, or a piece of fractured bone pressing on it, there is loss of sensation. If you tickle the feet, he does not feel it. You cannot arouse him so as to get an answer. The pulse is slow, and labored; the breathing slow, labored, and *snoring;* the pupils enlarged. Raise the head, unloose strings or tight things, and send for a surgeon. If one cannot be got at once, apply mustard-poultices to the feet, and leeches to the temples.

Choking.—When a person has a fish-bone in the throat, insert the fore-finger, press upon the root of the tongue, so as to induce vomiting;

if this does not do, let him swallow a *large piece* of potato or soft bread; and if these fail, give a mustard emetic.

Fainting, Hysterics, etc.—Loosen the garments, bathe the temples with water or eau de Cologne: fresh air; avoid bustle, and excessive sympathy.

Drowning.—Attend to the following *essential rules:* 1. Lose no time. 2. Handle the body gently. 3. Carry the body with the head gently raised, and never hold it up by the feet. 4. Send for medical assistance immediately, and in the mean time act as follows: First. Strip the body, rub it dry, and then rub it in hot blankets, and place it in a warm bed in a warm room. Second. Cleanse away the froth and mucus from the nose and mouth. Third. Apply warm bricks, bottles, bags of sand, etc., to the arm-pits, between the thighs and soles of the feet. Fourth. Rub the surface of the body with the hands inclosed in warm dry worsted socks. Fifth. If possible, put the body into a warm bath. Sixth. To restore breathing, put the pipe of a common bellows into one nostril, carefully closing the other and the mouth; at the same time drawing downward, and pushing gently backward, the upper part of the windpipe, to allow a more free admission of air; blow the bellows gently, in order to inflate the lungs, till the breast be raised a little; then set the mouth and nostrils free, and press gently on the chest; repeat this until signs of life appear. When the patient revives. apply smelling-salts to the nose, and give warm wine or brandy and water.

Cautions.—1. Never rub the body with salt or spirits. 2. Never roll the body on casks. 3. Continue the remedies for twelve hours without ceasing.

Hanging.—Loose the cord, or whatever suspended the person, and proceed as for drowning, taking the additional precaution to apply eight or ten leeches to the temples.

Apparent Death from Drunkenness.—Raise the head, unloose the clothes, maintain warmth of surface, and give a mustard emetic as soon as the person can swallow.

Apoplexy and Fits generally.—Raise the head; unloose all tight clothes, strings, etc.; apply cold lotions to the head, which should be shaved; apply leeches to the temples, and send for a surgeon.

Suffocation from Noxious Gases, etc.—Remove to the fresh air; dash cold vinegar and water in the face, neck and breast; keep up the warmth of the body; if necessary, apply mustard-poultices to the soles of the feet, and try artificial respirations as in drowning.

Lightning and Sun-Stroke.—Treat the same as apoplexy.

THE MEANS OF PRESERVING HEALTH.

HEALTH is indispensable to happiness and success. The capacity either to act or to enjoy, is dependent upon the measure of health which each individual possesses. A healthy family, other things being equal, has a decided advantage, in the race of life, over one the health of whose members is feeble. Hence it is of the first importance to know, and to practice, the means for its preservation. Were proper attention given to this subject in our families, a vast sum of suffering and misery would be avoided, many valuable lives prolonged, and the anxieties, cares, loss of time and expense, resulting from unnecessary sicknesses, would be saved.

The object of the following pages is to place within the reach of American families plain rules, easy of comprehension and practice, for the preservation of their health and vigor to the latest period of life. In a matter so important as human health, which also involves human happiness and life, it is scarcely necessary to apologize for the space we devote to it, or to urge attention to it as of the highest interest. If it be important to know and to practice the rules by which domestic animals can be reared with the greatest vigor and health, it is certainly quite as important that we should be equally well informed as to the means best calculated to rear properly our own offspring!

This department of our work has been prepared by a distinguished physician, and will be found entirely reliable and worthy of the fullest confidence of the reader.

Health is that state of the human body in which the structure of all the parts is sound, and their functions regularly and actively performed, rendering the individual fit for all the duties and enjoyments of life. When a person has received a sound constitution from nature, his health is to be preserved by a proper regulation of the various circumstances, internal and external, on which animal life is dependent. These are principally, air and exercise, clothing, food and drink, the excretions and discharges, sleep and waking, and management of the passions of the mind.

Air is that invisible, transparent, compressible, and elastic fluid which everywhere surrounds our globe, generally denominated the atmosphere. It is the medium in which we live and breathe, and without which we could not for a moment exist. Air is not a simple but a compound body consisting at least of four distinct substances, viz., oxygen, azote, carbonic acid, and aqueous vapor.

The two former substances, however, constitute almost the whole of the atmospheric air near the surface of the earth; the other two are variable in their proportions; the first exists only in minute quantities which it is difficult to appreciate. Vital air, or oxygen, which forms one-fourth of the atmosphere, is necessary to respiration and combustion, and an animal immersed in it will live much longer than in the same quantity of common air. The remaining three-fourths, called azote or mephitic air, is totally incapable of supporting combustion or respiration for an instant.

If a candle be included in a given quantity of atmospheric air it will burn only for a certain time and then be extinguished as the oxygen is all consumed, and that which remains is incapable of supporting flame. If an animal be put in a given quantity of common air, it will live only a certain time, at the end of which the air will be found diminished about one-fourth, and the remainder will neither support flame nor life.

The oxygen which is received into the lungs of animals from the atmosphere communicates the red color to the blood, and is the principal agent which imparts heat and activity to the system. When animals die for want of vital air their blood is always found black. Independently of its destruction by the respiration of men and other animals, there is a constant consumption of the oxygenous portion of atmospheric air by the burning of combustible bodies, by the fermentation and putrefaction of vegetable substances, and by the calcination of metals.

A diminished proportion, therefore, of the oxygen of our atmosphere, and an increased amount of carbonic acid, and other deleterious gases, is undoubtedly produced from the innumerable processes of combustion, putrefaction, and respiration of men and animals, particularly in populous cities, the atmosphere of which is almost constantly prejudicial to health. The atmospheric air is never absolutely pure and salubrious in any situation, but is always mixed with heterogeneous particles, and these different states and changes produce very perceptible effects on the constitution.

In the open country there are few causes to contaminate the atmosphere, and the vegetable productions continually tend to make it more pure. The winds which agitate the atmosphere, and constantly occasion its change of place, waft the pure country air to the inhabitants of the cities, and dissipate that from which the oxygen has been in a great measure extracted. Were it not for this wise provision of the author of nature, from the daily combustion of an immense quantity of fuel, the numerous substances constantly undergoing putrefaction, the respiration and exhalations of a large number of men and animals, the air in populous towns would soon become unfit for the purposes of life.

The air of any place where a numerous body of people is assembled together, especially if to the breath of the crowd there be added the vapor of a great number of candles or lamps, is rendered extremely prejudicial, as these circumstances occasion a great consumption of oxygen.

The practice of burning lamps with long wicks, and thereby filling the room with smoke, is very detrimental to health; and it is not a little surprising that common sense is so devoid of all philosophy as not to detect and avoid a vapor so pernicious and poisonous when received into the lungs.

The fact is well known, that when air has been long confined and stagnated in mines, wells, and cellars, it becomes so extremely poisonous as to prove immediately fatal to those who imprudently attempt to enter such places. No person should descend into a well or cellar which has been long closed, without first letting down a lighted candle; if it burns clear there is no danger, but if it ceases to burn, we may be sure that no one can enter without the utmost danger of immediate suffocation. It sometimes happens, also, that when air is suffered to stagnate in rooms, hospitals, jails, ships, etc., it partakes of the same unwholesome or pernicious quality, and is a source of disease. It is obvious, therefore, that in all confined or crowded places the correcting of vitiated air, by means of cleanliness and frequent ventilation, is of the highest importance to health, and the most effectual preservative from disease. No accumulation, therefore, of filth about our houses, clothes, or in the public streets, should on any pretense be suffered to continue, especially during the heat of summer.

It is a very injurious custom for a number of persons to occupy or sleep in a small apartment, and if it be very close and a fire be kept in it the danger is increased. The vapor of *charcoal*, when burnt in a close apartment, produces the most dangerous effects. Our houses, which are made close and almost air-tight, should be ventilated daily, by admitting a free circulation of air to pass through opposite windows; and even our beds ought to be frequently exposed to the influence of the open air.

Houses situated in low marshy situations, or near lakes or ponds of stagnant water, are constantly exposed to the influence of damp and noxious exhalations.

Among the most powerful means furnished by nature for correcting air which has become unfit for respiration, is the growth and vegetation of plants. The generality of plants possess the property of correcting the most corrupt air within a few hours, when they are exposed to the light of the sun; during the night or in the shade, however, they destroy the purity of the air, which renders it a dangerous practice to allow plants to vegetate in apartments occupied for sleeping.

Marshes.—The neighborhood of marshes is peculiarly unwholesome, especially towards the decline of summer and during autumn, and more particularly after sunset. The air of marshy districts is loaded with an excess of dampness, and with the various gases given out during the putrefaction of the vegetable matters contained in the waters of the marsh. Persons exposed to this air are liable to various diseases, but especially ague, bilious fevers, diarrhœas, and dysenteries. They who breathe it habitually exhibit a pallid countenance, a bloated appearance of the abdomen and limbs, and are affected with loss of appetite and indigestion. Health is best preserved in marshy districts by a regular and temperate life—exercise in the open air during the middle of the day, and by retiring, as soon as the sun sets, within the house, and closing all the doors and windows. The sleeping apartment should be in the upper story, and rendered perfectly dry by a fire, lit a few hours before going to bed, and then extinguished. Exposure to the open air should, if possible, not take place in the morning before the sun has had time to dispel the fog, which, at its rising, covers the surface of the marsh.

Night Air.—Many diseases are brought on by imprudent exposure of the body to the night air; and this, at all seasons, in every climate, and variety of temperature. The causes of this bad property of the night air, it is not difficult to assign. The heat is almost universally several degrees lower than in the day-time; the air deposits dew and other moisture; the pores of the skin are open, from the exercise and fatigues of the day; the evening feverishness leaves the body in some degree debilitated and susceptible of external impressions; and from all these concurrent causes are produced the various effects of cold acting as a check to perspiration; such as catarrhs, sore throats, coughs, consumptions, rheumatisms, asthmas, fevers, and dysenteries. In warm climates, the night air and night dews, with their tainted impregnations, act with much malignancy on the unwary European, who too often, after an imprudent debauch, or in a state of fatigue, absurdly lays himself down in the woods or verandas, to receive the full effects of the morbific powers, then unusually active. In civilized life, and in crowded towns, how many fall victims to their own imprudence, in exposing themselves to the cold, the damp, and the frostiness of the night air! Issuing from warm apartments with blazing fires, or from crowded churches, theaters, or ball-rooms, with exhausted strength, profuse perspiration, thin dresses, and much of the person uncovered, how many are attacked with a benumbing cold and universal shivering, which prove the forerunners of dangerous inflammations of the brain, of the lungs, or of the bowels, which either cut them off in a few days, or lay the foundation of consumption or other lingering illness. Such being the dangers of exposure to the night air, it ought to be inculcated on all, both young and old, to guard against them, by avoiding all rash and hasty changes of place and temperature, by hardening the frame by due exercise and walking in the open air in the daytime; and on occasions where the night air must be braved, taking care to be sufficiently clothed; and to avoid drawing in the cold air too strong or hastily with the mouth open.

Sea Air.—The air upon the sea and in its neighborhood is generally distinguished by its greater coldness, purity, and sharpness; and is, therefore, in many cases directed to patients, whose complaints do not affect their respiration, and who have vigor of constitution enough to derive benefit from the stimulus which such air occasions. A residence by the sea-side is beneficial to persons of a scrofulous habit and debilitated constitution, provided they take care not to expose themselves to cold and damp; and in the fine season, when there is no reason against it, they ought to bathe. In complaints of the chest, the use of sea-bathing, and a residence near the sea, are more questionable; and by such an inland rural situation, in a mild equable climate, is to be preferred. A sea voyage has long been famous for its good effects at the commencement of consumptive complaints; and these good effects may be ascribed partly to the good air at sea, partly to the affection of the stomach and skin induced by sea-sickness, and to the excitement of the mind, caused by change of scene and occupation.

Ventilation.—The air, as we have already remarked, cannot become stagnant or unchanged for even a short period without its becoming unfit for respiration, and destructive to the health of those who breathe it. The greater number of persons by whom an apartment or any given place is occupied, the more quickly the air becomes deteriorated, and the greater the necessity of a free ventilation. The streets of a city should, therefore, be so laid out as to insure a constant and free circulation of air; hence the unwholesomeness of a residence in narrow alleys, courts, and passages. Not less important is the continued renewal of the air of our apartments—the ventilation of which, however, should be so conducted as to prevent a current of air from blowing directly upon the persons within them. Our bed-chambers, in particular, should be freely ventilated during the day; and even at night, when the windows are closed, the chimney should be left open, or, if the room is small, and the weather sultry, a door, opening into another room. No consideration of economy should prevent the most constant attention being paid to proper ventilation, so essential is the latter to health and comfort.

Cellars.—It is important that cellars should be perfectly dry, kept strictly clean and freely ventilated. The damp and foul air so frequently generated in cellars where dryness, cleanliness, and ventilation are not properly attended to, is often the cause of disease, not only in the persons who inhabit the house to which the cellar is attached, but in others residing in the immediate neighborhood. No house can be considered a healthy residence, in the cellar of which water is allowed to stagnate. This may easily be obviated, in most situations, by a sink dug to gravel. The air of cellars can be preserved sufficiently dry and wholesome by free ventilation, the removal of all filth and corruptible materials, and frequently whitewashing the walls. Cellars, especially when entirely underground, are improper places of residence; appropriating them as places of residence for the poor, or as workshops, should be prohibited by law.

Heat.—The temperature of the human body, that is, of its internal organs, is about 98° of Fahrenheit's thermometer. This degree of heat is maintained independent of that of the surrounding medium, by the evolution of caloric within the body itself. Under ordinary circumstances, the human body is surrounded by an atmosphere many degrees colder than itself, and hence transmits constantly heat to the air; its energies are therefore tasked to evolve a sufficient amount of caloric to supply the loss thus occasioned. Nevertheless, when the temperature of the surrounding air greatly exceeds that of the body, and the latter is continually receiving heat from the former, its temperature is not raised in proportion. This arises in consequence of a diminished evolution of heat within, and of the increased transpiration from the surface, causing the loss of a large amount of the caloric it receives. Hence, at first sight it might be inferred, that the animal system is capable of being little influenced by the temperature of the atmosphere. This, however, is not strictly true; the changes in the temperature of the air cause in the body the sensation of heat or cold, according as they are to a higher or lower degree, and produce other important effects upon its various organs. Habitually subjected to an average temperature many degrees below its own, the body, when exposed to a heat of 98°, notwithstanding it can receive no increase of caloric from the air, experiences, nevertheless, a decided sensation of heat, and the skin and other organs are unduly stimulated. This arises from the animal heat being accumulated in the system. So, likewise, when suddenly exposed to a temperature many degrees below that to which we have been accustomed, but one, nevertheless, to which the term temperate may be applied, we experience a very considerable sensation of cold, and all the functions of the system suffer from its sedative effects—the caloric being extracted from the body more rapidly than it is evolved within. Every circumstance, likewise, by which the vital energies of the body are increased or diminished, will occasion the sensation of heat or cold to be experienced to a different extent, from the same degrees of atmospheric temperature. All degrees of heat beyond that of temperate produce a stimulant effect upon the skin, and through it upon the different internal organs. If the elevation of temperature occur gradually, and is confined to only a few degrees, its effects are often beneficial; but if it occur suddenly, or is considerable, either the stimulation of the skin or of some one or more of the internal organs, is carried to the extent of producing disease, and we have inflammation either of the skin, brain, stomach, or bowels, of a more or less violent grade; or the over-stimulated organs fall into a state of indirect debility. In consequence of this, and the excessive perspiration which ensues, the vital powers of the system become exhausted, and are unable to resist the impression of any morbific cause, however slight, to which it may be exposed—as cold and damp, errors in diet, fatigue, or a renewed excitation from subsequent exposure to heat. It is in this manner that high degrees of atmospheric temperature become a source of disease. Heat is likewise an indirect cause of disease, by its action upon various putrefiable materials, causing the evolution of certain gaseous substances by which the purity of the air we breathe is destroyed.

Cold.—Whenever the air or other medium, in which the body is immersed, is of such a temperature as to abstract from the latter its heat more rapidly than by the internal action of the system it is generated, the sensation of cold will be produced; and the intensity of this sensation will always be in proportion to the rapidity with which the heat of the body is carried off, and to the feebleness of the heat-generating powers of the system. Cold, or the abstraction of heat from the system, in a degree disproportionate to its powers of generating it, produces a sedative influence upon nearly all the organs. That is, it reduces their activity and diminishes or suspends their functions. It causes a diminution in the action of the blood-vessels and exhalants of the surface; hence, under its influence, the skin becomes pale, shrunk, and dry. It diminishes the action of the heart and arteries, as is evinced by the smallness, weakness, and diminished frequency of the pulse. The sensibility, first of the external parts of the body, and subsequently of the internal organs, is likewise diminished by the action of cold. Hence the numbness of the hands, fingers, and entire surface, as well as the diminished activity of the functions of the brain and nervous system generally, and the feebleness of the muscular action. It is by this sedative impression upon the nervous system of intense cold, that the almost irresistible inclination to deep sleep is produced in those exposed to very low degrees of temperature. The sudden application of cold occasions a hurried and irregular action of the respiratory organs; and when intense or long-continued, it materially impedes, or prevents entirely, the action of these organs, so that the respiration is so imperfectly performed, that the change of the venous into arterial blood no longer takes place, and the lips, tongue, and external surface of the body assume a livid or leaden hue. The moderate and transient application of cold to persons in robust health, and of considerable energy of constitution, is generally followed by phenomena which have misled many into the belief that cold acts upon the animal system as a stimulant.

Every one in health has experienced the bracing and invigorating influence of a bright winter's day, and has felt from it a healthful glow in his frame, and a degree of increased vigor throughout every organ. These effects, however, are not, strictly speaking, the immediate consequence of the low temperature to which the body is exposed, but they result from the reaction of the vital energies, after the first temporary reduction of their activity by the cold. The excitement of the surface and of the internal organs being reduced by the sedative influence of the reduced temperature, their susceptibility to the action of the ordinary stimuli is increased; hence, subsequent exposure to a slight augmentation of temperature, exercise, the friction and warmth of the clothing, even the stimulus of the blood, as the heart renews its activity on the withdrawal of the sedative agent, will induce an augmented excitement on the internal and external surfaces. Hence the agreeable glow of the skin, the augmented vigor and increased activity of the system, the improved appetite, and feeling of cheerfulness consequent upon a transient and moderate reduction of the temperature of the body. That these phenomena are solely to be referred to the reaction of the system, after a temporary diminution of excitement, is sufficiently established by the fact, that unless the system be endowed with a considerable degree of energy and activity, no such favorable effects will follow the action of cold. Upon the weak and exhausted, cold acts as a permanent debilitant; or, if reaction takes place, it is only partial, being confined to some one or a few organs, in which it causes not a healthy activity but disease.

There is not, indeed a more frequent exciter of disease than cold when applied to the body under certain circumstances. Were we to enumerate all the diseases to which cold gives rise, we should give a list of nearly all to which, in our variable climate, the human body is subject. The numerous inflammations of various parts, as the eyes, the throat, the chest, the lungs, the bowels; the inflammation of tendinous and membraneous parts, constituting rheumatism; catarrh, called by way of eminence, *a cold*; the rose, fevers of various kinds, consumption; these and many more, closely follow the application of cold; and whatever may be the distinction we make between predisposing and exciting causes, the plain, practical inference to be drawn, is the necessity of guarding against cold, and all those circumstances in its application on which depends its power of affecting the body with disease.

The circumstances which enable the human body to resist the morbific effects of cold, are a certain vigor of constitution, exercise, activity of mind, and the being occupied with some exciting passion. Cordials also, as wine, spirits, or other stimulants, prevent the body from suffering from the immediate effects of cold; but it is to be noted, that they who are in the habit of dram-drinking, are not those who are best able to resist the action of cold. The temporary stimulus of spirituous liquors is always succeeded by great weakness, and susceptibility to external impressions; and the unhappy drunkard, from the combined effects of his debility and exposure, is very frequently destroyed by disease induced by the sedative effects of cold.

CLOTHING.—One of the safest rules in the regulation of dress, is to ad-just it to the vicissitudes or fluctuations of the season; and this rule should be carefully attended to by the valetudinarian, the delicate, the infirm, and the old. The winter clothing should not be left off too early in the spring, not the summer clothing worn too late in the autumn. Neither should this rule be disregarded by the young, and those in the enjoyment of perfect health; for, though strong and robust persons may, with impunity, endure many changes of temperature without any change in dress, yet they should not be too slightly clothed; and all diminution in the amount of their dress should be made with extreme caution. Such persons, however, relying too much on the strength of their constitutions, often expose themselves imprudently; and, as the violence of their diseases is generally in proportion to the vigor of their vital powers, so are they frequently rapid in their progress and fatal in their termination. The grand rule is, so to regulate the clothing, that, when exposed to the external air, the difference of temperature experienced shall not be such as to produce any dangerous impression, whatever may be the inclemency of the weather, when we go abroad. Hence, the necessity of a thinner clothing within doors than without, and of a greater warmth of clothing after night, and during cold, damp weather, than during the day, and when the air is perfectly dry.

Persons of delicate and irritable constitutions, whose powers of life are feeble, and whose circulation is languid and irregular, are very apt to suffer severely by a very slight diminution of the temperature of their skin. This is also the case with invalids. All such persons, therefore, ought rather to exceed, than be deficient in, the quantity and warmth of their clothing.

But while clothing should not be too light, or too small in amount, neither should it be too heavy, or too much in quantity. The effects are equally mischievous. By overclothing, too much perspiration is drawn out of the body, by which the frame is greatly weakened, and coldness and numbness of the extremities are occasioned.

Dress is often injurious in consequence of its being made fashionable, in compliance with the modes and customs of the times; frequently occasioning innumerable maladies, either by compressing the muscles or viscera, stopping the access and retreat of the blood to and from the head, or from circulating through the veins, or preventing the free expansion of the chest or the unconstrained action of the limbs.

Tight clothes are invariably detrimental to the health, comfort, and symmetry of the body. By the pressure they make upon the muscles, and the impediment they offer to their free exercise, they produce in them an emaciation and debility which prevent them from supporting properly the natural and graceful position of the body, or of effecting its active movements with sufficient vigor. They prevent, also, the free circulation of the blood, and cause it to accumulate in the veins of the head, lungs, or abdomen. When the pressure of the clothes, or any part of them, is around the neck, it is apt to produce headache, discoloration of the face, vertigo, and apoplexy, or other diseases of the brain; when upon the chest and waist, it prevents the full development of the lungs, impedes respiration, and interferes with the proper action of the heart, in consequence of which, the health of the whole system suffers; when around the abdomen, the stomach, liver, and intestines are affected, and indigestion is produced, or the nutrition of the whole body is rendered imperfect. The clothes, therefore, should be perfectly loose, leaving to every part the fullest liberty, and to all their natural and unconstrained motions. This is all-important at every period of life, but particularly so during infancy and childhood.

Another practice, equally pernicious to health, is that of going about all the morning and first part of the day, the men muffled up in great coats, and the women with furs and flannels, while, in the afternoon and evening, they sit at home, or brave the external air in a much thinner dress, which but imperfectly covers, or leaves bare, parts of the body which in the previous portion of the day were closely enveloped in the warmest clothing.

Flannel.—Flannel worn next the skin, in addition to the ordinary clothing, is of very great service in preserving the health of the inhabitants of all cold and temperate climates, more especially where the vicissitudes of temperature are frequent and considerable, as well as during the seasons of spring, autumn, and winter, in our own climate. It produces a moderate warmth of the surface, promotes perspiration, readily absorbs the perspired fluids, and easily parts with them again by evaporation, on account of the porous nature of its texture. These important advantages render the use of flannel at all seasons of inestimable service to the valetudinary and the aged, and all those subject to disorders of the chest, bowels, etc. Hufeland has justly remarked, that it is the very best dress for those who have begun to decline in years; for all who lead a sedentary life; for individuals subject to cough or frequent colds, gout, diarrhœa, and the like; for all nervous patients, and convalescents from severe chronic disorders; to persons who are too susceptible of the impressions of the atmosphere; and lastly, in such climates and pursuits of life where exposure to sudden changes of temperature, and to wet or moisture, is unavoidable.

Flannel is also well adapted for infants and young children, especially in autumn, winter, and spring. Older children do not require it, excepting during the seasons of greatest cold, and all persons under forty, in good health, should reserve it as a resource for their declining years, during which it becomes every year more and more useful and necessary. Flannel ought not to be habitually worn at night. By far the best practice is, to throw it off in bed, unless, from great debility or age, sufficient warmth cannot be insured by a moderate quantity of bed-clothes. The necessity of frequently changing the flannel, in order to preserve it strictly clean, need scarcely be urged, as it must be apparent to all.

Cotton.—Cotton, as an article of clothing, especially when worn in contact with the skin, is far better adapted for general use than linen. It is much better adapted for preserving the equable warmth of the surface, and guarding it from sudden vicissitudes of temperature; but it is inferior in these respects to flannel. In warm weather, and in hot climates, it is, in every respect, the most comfortable and wholesome article for an inner dress. It is cooler than linen, inasmuch as it conducts more slowly the excess of external heat to our bodies, and when a sudden reduction of atmospherical temperature occurs, on the other hand, it abstracts more slowly the heat from the body, and thus preserves the surface of a more steady and uniform temperature. For children and young persons of robust and healthy constitutions, it should constitute the material of the inner garment throughout the year.

Linen.—Whatever may be said in favor of the comforts of linen, and the greater ease with which it is kept clean, it is by no means a substance well adapted for the dress worn next to the skin at any season of the year nor by any class of persons. In the winter it is altogether insufficient to preserve the surface of a proper temperature or to guard it against sudden changes. For children, and the laboring classes generally, as well as by all delicate persons, muslin should be preferred for summer wear, and soft flannel for winter. The chief objections to linen are, that it is too good a conductor of caloric, and hence causes the body to feel the influence of very high or low degrees of atmospheric temperature; it imbibes readily the matter of perspiration, and when wet, communicates a disagreeable chilliness to the surface with which it is in contact.

Head-Dress.—Whatever covering is worn upon the head should be light, sufficiently large, and adapted in its form to the shape of the head. Too heavy or warm a covering, or one which compresses unduly the head, is productive of pain and inconvenience. In summer, the color of the hat or bonnet should be white, or at least some shade approaching to white, in consequence of the tendency of all dark colors to absorb and transmit the rays of heat. The brim of the hat should also be sufficiently broad to protect the face and the eyes from the sun. Although the nature of a head-dress may appear to be a subject of very little importance in regard to health or comfort, yet every one has perhaps experienced more or less of the pain and inconvenience occasioned by wearing a new hat too small in the crown and unfitted in shape to the head, and the almost immediate relief which results from exchanging it for one of more ample dimensions; while we are assured by physicians, that disgusting, painful, and even dangerous affections of the head are caused by the warm, thick coverings constantly worn upon the head by the peasants in the different parts of the north of Europe.

Caps.—The head, excepting perhaps in the first months of infancy, is sufficiently protected from cold and other external agents, by its natural covering of hair; hence, every kind of artificial covering is, to say the east of it, unnecessary—even during exposure to the open air. Caps are particularly objectionable in children; by keeping the head too warm, and by the roughness of their texture when richly worked, producing an irritation of the parts with which they are in contact, they cause too much blood to be sent to the vessels of the head, and thus increase the danger of diseases of the brain, eruptions, and sores about the scalp, the forehead, and the ears being produced; while the broad border of lace with which they are so often ostentatiously decked, interfering with the motions of the eyes, produces often a permanent squint. In adults caps should never be worn, excepting when the head has become prematurely bald, as the cooler the head is kept when possessed of its natural covering, the hair, the less danger there is of affections of the brain or of the ears and eyes. Wearing caps at night is likewise always an objectionable practice, excepting when the individual is accustomed to them during the day.

Cravat.—The neck might be left entirely uncovered from the period of birth without injury, probably with advantage to health. But so long as the imperious laws of custom and fashion require the use of a covering to this part of the body in the male sex, it is important that of whatever it is composed it be very light and loosely applied. When the neck is kept too warmly covered it becomes peculiarly liable to the impression of slight degrees of cold; the throwing off of the cravat for a few moments, or exchanging it for one of lighter materials, will often give rise to a violent inflammation of the throat. When the cravat girts too tightly the neck, it prevents the free return of the blood from the head, causing a constant pain and sense of over-fullness.

Corsets.—Of all the whims of fashion no one is more absurd or more mischievous in its effects than that which condemns the female, under the pretense of improving the grace and beauty of her shape, to the torture of a tightly-laced corset. Equally detrimental to comfort and to health, this portion of female attire cannot be too severely censured by the physician. It is productive of not the least advantage, real or imaginary, to compensate for the injury it produces, nor to excuse the folly of females in persisting in its use. The immediate effect of the corset is, by compressing firmly the chest, to prevent its free expansion in the act of breathing, and hence to impede materially the function of respiration; a less amount of air is taken into the lungs in inspiration, and, as a consequence, the blood is less perfectly changed. The impediment to respiration is increased when the corset extends so low as to compress the abdomen; by the bowels being then forced upward against the diaphragm, the latter is prevented from descending, and the dimensions of the chest are thus contracted from below. A sense of oppression and weight is always experienced about the breast when the corset is drawn very tight around the body; the breathing is short, quick, and panting; and not only is the blood prevented, in a great measure, from undergoing that change in the lungs by which it is adapted for the healthy nourishment of the various organs, but the actions of the heart are also impeded; violent palpitation of the latter is not unfrequently produced, accompanied with a sense of vertigo, and occasionally fainting. When the corset is worn constantly from early youth, the growth of the ribs is prevented, and the whole capacity of the chest is permanently contracted; and hence spitting of blood, difficulty of breathing, or even more dangerous and fatal diseases of the lungs and heart are induced. Consumption is a very common complaint, the production or aggravation of which may be traced to tight lacing. But it is not merely to the chest that the injurious effects of the corset are confined; it likewise compresses the whole of the upper portion of the abdomen, and by the yielding nature of this portion of the body, the pressure upon the organs within is even more considerable than that experienced by the heart and lungs. The liver, the stomach, and the intestines in particular, experience this pressure to a very great extent; in consequence, the free and healthy secretions of the liver are prevented from taking place, the stomach and the bowels can no longer perform their functions with proper vigor and regularity; the digestion of the food is impeded, and the bowels become costive and distended with wind. In this manner, in connection with the injury inflicted upon the lungs, the vigor of the whole system becomes prostrated from the use of corsets; the skin assumes a sallow hue, the countenance a haggard and wrinkled appearance, and all the functions of life are performed imperfectly. It is a fact, that nothing is better adapted to produce the premature decay of beauty, and the early appearance of old age, than the use of the corset.

There are two other effects produced by this article of dress, which would be sufficient of themselves to induce every prudent and sensible female to abandon it. The first is the injury inflicted upon the breasts, by which their proper development is prevented, and the nipple is almost entirely obliterated, so that, when called upon to fulfil the sacred office of nurse toward her offspring, the mother finds, to her sorrow, that, from her folly, she has totally incapacitated herself from performing its duties, or experiencing its pleasures. The second effect is that produced by the pressure of the corset upon the pelvis and the womb, more especially when worn in early youth, or during the first stages of pregnancy. From this cause barrenness, miscarriages, or a stunted and deformed offspring may result, or the pains, the difficulties, and the dangers of child-birth, may be increased to a frightful degree.

Serious as are the injuries we have thus detailed, they are far from being all to which tight lacing gives rise. The firm pressure of the corset upon the muscles of the back and of the chest preventing these from performing freely their several motions, and their vessels from receiving a due supply of blood for their nourishment, cause them to become pale and diminished in bulk and in strength. Hence, when attempted to be called into action by the exercise of the arms and upper part of the body, fatigue and exhaustion are quickly induced. Upon the proper tone or strength of the muscles of the back depends principally the upright position of the back-bone, and of course of the whole trunk: when therefore these muscles are debilitated by the long-continued pressure of the corset, an ungraceful curvature of the body to one or other side results, amounting often to very striking deformity. This is frequently increased by the voluntary twisting of the body, or of the shoulders, in order to escape from the constraint experienced, as well as from the uneasy sensations occasioned by the pressure of the corset upon some particular point. In a very large number of instances it will be found that, in the female who has worn a corset from her youth, the shoulders are thrown more or less out of their natural position—an ungraceful elevation of one, and an undue depression of the other, is a very common occurrence.

Garters.—The best garters are made of elastic webbing, and fastened round the leg with a flat buckle. Tight garters are injurious by impeding the circulation of the blood in the leg, particularly by preventing the free return of the blood from below the part on which they are fastened toward the heart. Swelling and numbness of the leg, and permanent enlargement of the superficial veins of that limb, are consequences of wearing tight garters.

EXERCISE.—The body of man is evidently formed for activity and exertion. By labor or exercise man preserves his health, augments his strength, and improves his mental faculties, besides procuring the means of his subsistence, and the conveniences of life. In regard to health, none of the various processes connected with the important functions of digestion, circulation, and nutrition could be properly or adequately performed unless the body were stimulated for that purpose by labor or exercise. The health of all the parts, and the soundness of their structure, depend on a free supply of blood, and the perpetual absorption and perpetual renovation of the atoms of which they are composed; and exercise, by promoting at once circulation, absorption, and secretion, invigorates life without hurrying it; renovates all the parts and organs, augments their strength and vigor, and preserves them apt and fit for every office they have to perform.

By this means disease may often be prevented, and not unfrequently cured, even when it has taken a very strong hold upon the constitution. Generally speaking, a slothful and sedentary life is the source of all those diseases which are termed slow or chronic, the number of which is in our day very considerable. Among these, scrofula, indigestion, bilious and liver complaints, lowness of spirits and nervous irritability, and pulmonary consumption, stand foremost; and there may be added to them jaundice, various deformities, as twisting of the shoulders and curved spine, palsy, apoplexy, etc. The neglect of exercise likewise occasions either an emaciation, or, when conjoined with luxurious living, a bloating and over-fatness of the body. For these, exercise is one of the most effectual as well as the most agreeable remedies; it strengthens every organ, preserves the fluids in a healthy state, augments the appetite, facilitates the secretions, invigorates the spirits, and excites pleasing sensations throughout the whole system.

The exercise which is necessary to the maintenance of the health, vigor, and the perfect and full development of the human frame, is such as will bring into action every limb and muscle; this is termed *active* exercise, and is produced by the exertions of the body in walking, running, dancing, and various species of labor.

Passive exercise, or that in which the motion is communicated to the body from without, can never be adopted as a substitute for the former, as it calls into action but imperfectly the powers dependent upon the will, and therefore leaves a large portion of the muscular system entirely inactive; at the same time, the motion itself is generally so slight, that it can contribute but little to correct the evils arising from the long-continued sedentary habits and the full diet of those who most generally resort to it. Passive exercise, under certain circumstances, however, is of advantage; but whenever active exercise can be pursued, it should always receive a decided preference. The chief kinds of passive exercise are riding, swinging, and sailing

To derive all the advantage resulting from exercise, it must be regular; several hours daily should be devoted to it. Little benefit need be expected, when, to occasional exercise of the muscles, a long period of inaction succeeds. Exercise, to be beneficial, must also be in the open air, and should never be carried to the length of inducing undue fatigue. The other general rules in regard to exercise may be laid down as follows:

1. The effect of exercise should be as general as possible, and not confined to any particular limb or part of the body. Those kinds of exercise, therefore, which give action to the greatest number of the bodily organs, as walking, running, riding on horseback, etc., are much to be preferred.

2. Little benefit is to be expected from exercise unless it be performed in a pure air; and hence it is that many manufacturers and artificers, who perform all their labors under cover, and are often exposed to unwholesome effluvia from the materials they work upon, are more unhealthy than almost any other class of men.

3. The higher and drier the situation, and the more varied the air in which exercise is performed, the more beneficial will be its effects.

4. On commencing any exercise, we should always begin with the more gentle, and then proceed to the more laborious; and as sudden transitions are always wrong, the same rule should be followed when exercise is given up.

5. A good appetite after exercise is a proof that it has not been carried to any improper excess.

6. After having taken exercise, we should not venture to expose ourselves to a current of air, or rest out of doors in a cool or exposed place, or lie down upon the ground. A sudden change of temperature thus induced, by suppressing perspiration, may be extremely injurious.

7. It is a good rule frequently to vary the exercise.

8. Lord Bacon correctly observes, it is requisite to long life that the body should never abide long in one posture, but every half hour at least should change it, saving only during sleep.

9. Muscular motion is most agreeable and healthful when the stomach is neither too empty nor too much distended. Active exercise is improper, therefore, immediately after a meal or after long fasting.

10. Nothing can be more injudicious than to sit down to a sub stantial dinner or supper immediately after a fatiguing walk, ride, or other violent exertion. When the body is heated, or in a state of perspiration, to devour quantities of solid food can never be wholesome. Every man, therefore, should rest for some time after exercise before he sits down either to dinner or to supper.

11. In taking exercise the dress should be free and easy, particularly about the neck and joints.

12. In violent exercises, a flannel waistcoat ought to be worn next the skin, to obviate the possibility of injury from a sudden chilling of the surface of the body.

13. It will always be found very refreshing, after fatiguing exercise, to wash the feet in warm water before going to bed.

14. Serious thinking when we are walking or taking other exercise soon fatigues us; but if we give ourselves up to amusing thoughts, or the conversation of agreeable and intelligent friends, the good effects resulting from exercise are increased.

15. It is very desirable to have a certain object or spot by which the exertion is to be bounded, as to call at the house of a friend, to see some

delightful prospect, and the like. Exercise undertaken merely as a task, or without being connected with some purpose by which the mind is agreeably occupied and excited, is seldom productive of much advantage.

Walking.—There is no exercise so natural to us, or in every respect so conducive to health, as walking. It is the most perfect kind of exercise in which the human body can be employed; for by it every limb is put in motion, and the circulation of the blood is effectually carried on throughout the minutest veins and arteries of the system, while both the body and the mind are amused and enlivened. This salutary and most excellent exercise is in the power of all persons having the use of their limbs, and can be adapted, in degree and duration, to the various circumstances and wishes of each individual.

Walking is of two kinds, either on plain ground or where there are ascents. The latter is in every respect greatly preferable, as by it the lungs are exercised, and the ascent and descent agitates the body, unless it be in a weak state, with a useful variety. Walking against a high wind is very severe exercise and not to be recommended.

As, from various circumstances, persons residing in large towns, and engaged in sedentary occupations, cannot take all that exercise abroad which is necessary for their health, they ought, at least as much as possible, to accustom themselves to walk about even in their own houses instead of sitting constantly at a desk or table, as is usually the case. This rule is peculiarly necessary to be attended to by literary men; and though such practice does not make up for the want of exercise abroad, yet it is, to a certain extent, a substitute for it.

The following rules are recommended to the attention of those who make use of this excellent species of exercise:

1. The most proper walk, for health, is in a pure and dry air, and in rather an elevated situation, avoiding marshy and damp plains.

2. In the summer season the walk should be taken morning and evening, but by no means during the middle of the day, unless the person be guarded from the oppressive heat of the sun, under the shade of woods or trees; in winter, the best period of the day for walking is usually after breakfast, or from ten to one o'clock.

3. It is advisable occasionally to change the direction of the walk; for, the same road constantly gone over, may excite as many disagreeable and painful sensations as the closet or the study.

4. We ought to accustom ourselves to a very steady and regular but not to a very quick pace; in setting out it should be rather slower than what we afterward indulge in.

5. An agreeable companion during a walk contributes much to serenity of mind; but unless the manner of walking of both is similar, as well as the taste and character congenial, it is better to walk alone, as either the one or the other of the two companions must be subjected to some constraint.

6. To read during a walk is an improper action, highly detrimental to the eyes, and destroys almost all the good effects that can be derived from the exercise.

Dancing.—Dancing, under proper limitations, is a wholesome exercise, and well adapted to young persons, especially in winter; violent and too long continued exertion in dancing is however injurious. Dancing should be performed in a large, well-ventilated apartment, and the dress worn by those who engage in it should be such as not to bind or constrain any part of the body, especially the chest, upper part of the abdomen and limbs. Dancing for the greater part of the night in overheated and crowded apartments has not unfrequently laid the seeds of fatal disease, by which the young and gay have been hurried in a few weeks to the grave. The injury done to the constitution by over-exercise at the midnight ball is most generally augmented by improper food and drinks, and by subsequent exposure to the night air when the body is unduly excited and fatigued by the exercise and other stimulating agents to which it has been subjected.

Swimming.—For the young, the robust, and healthy, swimming is an excellent recreation. It combines all the advantages to be derived from bathing with active exercise of nearly every part of the body. It possesses another important recommendation, which should cause it to be taught to, and practiced by every one; its presenting, namely, a means of safety in cases of accidental submersion to the individual himself who has acquired the art of swimming, while it may enable him to save the lives of others, under similar circumstances, who are unacquainted with it. Swimming, however, as well from the powerful and constant exertion it demands, and the coldness of the water in which the body is immersed, is improper for the debilitated, or those exhausted at the time from fatigue, profuse perspiration, or any other cause. Though adapted to a larger class of persons than the cold-bath, all the remarks made in reference to the latter are applicable to swimming, nor should those which refer to the state of the body at the time ever be neglected.

Gestation.—Gestation is that species of exercise which is communicated to the body by foreign means, with but little or only partial exertion of the muscles. The principal modes of gestation are, riding in a carriage or on horseback, being carried in a litter, sailing, or swinging, either in a suspended seat or on an elastic board. Gestation does not afford sufficient exercise for the demands of the system during a state of health; it is, nevertheless, occasionally proper, and in certain diseases, or for persons in a state of considerable debility, it is the only species of exercise that can with propriety be resorted to, and under such circumstances its effects are very beneficial.

Riding.—Next to walking, riding on horseback is the most salutary and useful species of exercise, especially for invalids. Riding may be varied according to the strength of each individual and the state of his health, by walking, pacing, trotting, or cantering.

Persons laboring under ill-health, whether occasioned by too long-continued sedentary habits, or from defective digestion, as well as those predisposed to consumption, will experience from the exercise of riding the most decided advantage.

In riding to preserve health, eight or ten miles a day are sufficient to answer all the purposes we would wish for; but, in riding to restore health, these little excursions will avail nothing. To attain the latter object, the mind, as well as the body, must be roused from its languor

In taking an airing, as it is called, we ride over the same ground, for the most part, every day. We see no new objects to divert us; and the very consideration of riding for health sinks our spirits so much, that we receive more harm than good from it. Upon this account, long journeys are recommended to such people, in order, by the variety or novelty of the scenes through which the invalid passes, to awaken or divert the mind. Many have, by these means, been surprised into health.

Riding in a carriage has but few advantages; it communicates but little motion to the body, and when the blinds are closed, the persons using it are excluded from the benefit of fresh air, upon the free exposure to which the success of all kinds of exercise in a great measure depends. It should be used only by such persons as are unable to walk or to ride on horseback, and with the blinds open. It is to be lamented that those people use this mode of exercise most who stand in the greatest need of a more violent species.

Riding in a gig or chair, if the individual himself drives, is a far better exercise than that of a carriage. The less gentle the motion of the vehicle in which we ride, and the rougher the road, the greater is the amount of exercise communicated to the body. Riding, however, except on horseback, if long continued, causes a feeling of soreness and stiffness in the limbs; and in the aged and debilitated, a swelling and numbness of the feet and legs.

Sailing.—Sailing upon the water is generally described as being the most advantageous of the passive kinds of exercise. Much, however, of what has been said in regard to it, whether as a means of promoting health or removing disease, is extremely vague and unsatisfactory. The influence of an hour's sailing upon the system, in a pleasure-boat, is very different from that which would result from an East India voyage, or a cruise with an Anson or a Cook around the world. The effects will also differ, according as the individual is placed in the situation of a mere passenger on board the vessel, or is obliged to partake of the homely fare, the broken rest, and the fatiguing labors of the sailor.

Rowing a boat, to those who are not daily accustomed to the task, may be ranked among the most active species of exercise. To the robust and those in perfect health, this exercise, when not carried to the extent of producing very considerable fatigue, is one admirably calculated to impart strength to the arms, and breadth and development to the chest. When, however, it is too frequently repeated, to the neglect of other species of exercise, it is very apt to produce a partial and ungraceful expansion of the frame.

The management of a sail-boat is a more attractive and far more gentle exercise than rowing. As a means of preserving health, it is, in every respect, however, inferior to either walking or riding—but affording to many an agreeable and useful variety in the means of exercise, it may be occasionally resorted to with no little advantage.

A trip in one of our steamboats has no claims to the title of exercise. The good effects which the infirm or convalescent derive from it, are to be attributed solely to the agreeable occupation of their minds by change of scene, and to the pure atmosphere they are enabled to breathe. During the summer months, short daily trips in a steamboat afford, however, an admirable means of counteracting the deleterious influence of the heated air of the city upon infants and young children —it is, indeed, almost the only manner, when a removal to the country cannot be effected, in which the occurrence of the dreaded summer-complaint can be prevented, or, when present, its violence mitigated.

Friction.—Friction of the surface, in conjunction with regular bathing, forms a very important means of preserving and improving the health of the body. It removes thoroughly from the surface every species of impurity which may accidentally adhere to it—promotes the freedom of the blood's circulation in the minute vessels of the skin, and insures the regular and perfect performance of the important functions of that organ. It promotes the growth and development of the muscles—invigorates the digestive organs, and imparts a comfortable glow and an increased energy to the whole system, by which it is rendered less liable, during cold and changeable weather, to become affected with disease. The ancients, it is said, had the art of rendering fat people lean, and those that were emaciated fleshy, partly by means of a proper course of active exercise generally, but more especially by the diligent use of frictions of the skin.

Though useful to all, frictions are peculiarly adapted to increase the health and vigor of persons of debilitated habits, who lead a sedentary life, are subject to dyspepsia, gout, and rheumatism, or who are particularly liable to be affected by cold or slight variations of atmospheric temperature. Their whole bodies, more particularly their limbs and the anterior part of the trunk, should be rubbed for half an hour at least, morning and evening, with a flesh-brush or coarse towel, until the surface begins to grow red, and assumes an agreeable glow. In many cases, promising the use of the warm bath, or sponging the body with cool or tepid water, will be found to increase the good effects to be derived from the practice. Frictions are highly useful in the case of delicate females; and in children they promote their growth and activity, and prevent many of the diseases to which they are liable.

The best time for using friction is in the morning and evening, but especially the former, when the stomach is not distended with food. They who are subject to wakefulness and disturbed sleep, will find, in addition to a properly-regulated diet and active exercise in the open air, that sponging the body with tepid water, followed by brisk frictions of the surface, will more effectually induce quiet repose than any other means.

Gymnastics.—By gymnastics is meant a series of regular exercises calculated to call all the muscles into action, and properly graduated, according to the age, strength, health, and other circumstances of different individuals. Whether gymnastics be considered as a means of active exercise, well adapted to the condition and wants of the inhabitants of large cities—as making a part of the physical education of students and of youth generally—or as a remedy in certain diseased states of the human body, their importance is confessedly great, and the advantage to be derived from them, under either point of view, has been strangely overlooked or underrated, in this country in particular. Every large city should possess its public gymnasium, open to all classes of its citizens. The languor and lassitude induced in the sedentary artisan, in the clerk, and in the shopkeeper, by their daily occupations, will be effectually dissipated by an hour devoted to the varied exercises of the gymnasium; while the mechanic, some of whose muscles are called by his labors into constant and active exertion, while others are allowed to remain totally inactive, will find at the gymnasium the means of restoring that harmony in the strength and development of the different parts of his body, by calling all into equal action, which his ordinary pursuits tend so powerfully to destroy. We know of nothing which would so effectually prevent the occurrence of diseases of the stomach, or improve the health of mechanics generally.

Calisthenics.—By calisthenics is meant a regular and methodical series of bodily exercises, adapted to call into equal and sufficient action the various muscles of females, in order to promote the general health and development of their systems, to prevent deformity, and to remove that languor and inertness of various functions produced by the confinement and sedentary habits to which the female sex is so generally and improperly subjected. Of the importance and beneficial effects of calisthenic exercises in civil life, there cannot be a doubt. By the ridiculous prejudices of fashionable society, girls are debarred from participating in the active sports of childhood, and during the period of their education, as well as in after life, for the greater part of the day, they are forced to breathe a confined atmosphere, and to remain in a state of comparative inaction. The effects of this mode of life upon the health can only be counteracted by exercise in the open air; and in the present state of society in this country, calisthenics present almost alone the plan of exercises adapted for general use.

APPETITE.—Appetite is that instinctive sensation which warns man of the necessity of partaking of food for the support of his system. The indulgence of the appetite is attended with pleasure; neglecting its calls is productive of painful feelings, more or less intense.

There are three kinds of appetite: 1st. The *natural* or *healthy* appetite, which is stimulated and satisfied with the most simple food, as certainly as with the most palatable; 2d. The *artificial* appetite, or that excited by condiments, liqueurs, pickles, high-seasoned dishes, variety of food, wine, etc., and which remains only so long as the operation of these stimulants continues; 3d. The appetite *of habit*, or that by which persons enjoying no inconsiderable health, accustom themselves to take food at stated hours, but frequently without relishing it. The *true* and *healthy* appetite alone can ascertain the quantity of aliment proper for the individual. If we were seldom to trespass the due limits of temperance, our natural appetite would be able accurately to determine how much food we may consume with satisfaction and benefit; but the usual physical education of children is now so loose and badly conducted, and the temptations to eat of improper food, and at improper times, are rendered so powerful by the refinements of cookery and the artificial habits of society, that we rarely meet with a natural and healthy appetite at any period of life. If, after a meal, we feel ourselves refreshed, and as cheerful as before it, or more so, we may be assured that we have taken no more than a proper quantity of food; for, if the right measure be exceeded, torpor, heaviness, and relaxation, are the necessary consequences; our faculty of digestion will be impaired, and a variety of complaints gradually induced. The celebrated *Cornaro* used to speak with delight of the cheerfulness and serenity he felt after partaking of the small portion of plain food which he was accustomed to enjoy. Before he determined on adopting a spare diet, he was much afflicted with lowness of spirits, heaviness, and debility, and severe bowel complaints were the torment of his life; but his careful and abstemious diet perfectly cured him of these and other evils. There can be no doubt that the majority of persons in this country, in easy circumstances, eat and drink considerably more than is either necessary or beneficial. It is a remarkable fact, that almost all those who have lived to a great age, have uniformly observed a very temperate diet; and in numerous instances of longevity it has been scanty and coarse.

Abstinence.—By abstinence is meant either the refraining entirely from food, or for a certain period, or from some particular species of food habitually. In a more limited sense, however, abstinence implies extreme moderation and temperance; the sustaining life upon the smallest possible amount of food, and that of the simplest kind. Entire abstinence from food cannot be endured for any great length of time by persons in health without its producing the most distressing sensations; and if food be still withheld, or the individual is enabled to control the desire to partake of it, a diseased condition of the body is induced, terminating quickly in death. The effects of prolonged abstinence are, general and excessive emaciation, a diminished size and colorless state of the muscles, extreme debility, the blood becomes deficient in quantity, and altered in its qualities, and the other fluids undergo a similar change. The functions of the brain often become deranged, and death is preceded by delirium. The length of time an individual may survive under entire abstinence from food varies according to his age, constitution, habits, and a variety of other circumstances. Many instances of long-continued abstinence being endured with perfect impunity are recorded; but in general it will be found that these have occurred in persons laboring under disease, who were in a state resembling somewhat that of torpid animals, or that while they abstained from solid food they drank various fluids, more or less nutritive. Abstinence from food for a limited period is often, during health, of very great importance; it is one of the most powerful means of obviating the effects of any accidental excess, of warding off an impending attack of disease, and of removing those disorders of the stomach incident upon the introduction into it of aliment of an improper kind. Occasional abstinence from food, by omitting a meal or two, or substituting for an animal diet a bowl of gruel, or a slice of bread and tea, restores the force of the digestive organs, by diminishing their action, and giving them rest and time to resume their healthful energies; while, at the same time, when the system is rapidly verging into disease, or the vessels are overloaded with blood, it removes from the first a stimulus which might increase its deviation from health, and upon the second it acts as an evacuant, by allowing the secretions time to remove from them their excessive amount of fluids. The studious, as well as they who lead sedentary lives, are especially benefited by occasional abstinence, as such persons, from th want of sufficient exercise, are generally the severest sufferers from dis eases of repletion, and from a disordered state of the digestive organs. Diseases of the most violent character, may often be prevented by the observance of an abstemious diet during the period of their prevalence; and they have often been cut short by rigid abstinence from food from the moment the symptoms are experienced which threaten their attack. Abstinence, says Dr. Miller, is one of the most convenient means of curing disease. No confinement is necessary, no interference with the ordinary occupations of life. If the apprehensions which give rise to it prove groundless, no trouble nor injury is sustained, but the system, freed from unnecessary excitement, feels a lucid interval not often experienced by the votaries of luxury, and afterward returns to a more substantial diet with redoubled satisfaction. If the disease about to attack be of a moderate kind, abstinence alone will often be sufficient to strangle it in the birth; if more violent, and our easy precaution should prove insufficient, some advantage, and of no trifling amount, will at least have been gained. The stomach will certainly be in a better condition for the reception of other remedies.

Surfeit.—By a surfeit is meant an overloading of the stomach with too great a quantity or mixture of food, or by indulging in food of a very rich or indigestible quality. The effects of this, if it be not got rid of at once by the vomiting which sometimes spontaneously occurs, are nausea, acid or acrid eructations, pain of the head, flatulency, disinclination to food, a sense of chilliness, alternating with flushes of heat; pains in the stomach and bowels, and disturbed sleep. These symptoms often continue for many days, and then produce a looseness of the bowels, or even profuse and obstinate diarrhœa. The prudent will always carefully avoid a surfeit, it being one of the most certain means of destroying the tone and inducing disease of the stomach. When intemperance of this kind has been committed, a gentle emetic should be given, followed by a dose of calcined magnesia, and for some time the diet should be of the lightest kind, as thin gruel or panado, toast and water, or crackers with milk.

Food.—A sufficient supply of food, of a wholesome and nourishing quality, is essential for the support of the system in health, and to enable it to undergo that amount of labor to which each individual is subjected. Excess of food, even of the lightest and most wholesome kind, interrupts digestion, oppresses and irritates the stomach, produces a feverish heat of the surface, loads the vessels with an excess of blood, and, when sufficient exercise is not taken, renders the body unwieldy, by the accumulation of fat beneath the skin and around the abdominal and thoracic organs. The action of the heart becomes sluggish, muscular exertion is performed with difficulty, the mind is rendered dull and torpid, and the body is predisposed to various acute and rapidly fatal diseases, from very slight causes. Equally injurious is a deficiency of food. The energies of the body and of the mind suffer, and disease is as certainly induced by inanition as by repletion. The just medium must be left to the instinct and reason of each individual, in whom the quantity required will vary considerably, according to his age, constitution, occupation, and degree of health. It may be safely inferred, however, that a person in health has not transgressed the bounds of moderation, if, on rising from his meals, he feels light and cheerful, with a stomach unoppressed, and a capability of applying himself at once to study or to labor; while, on the other hand, if he experience giddiness, heaviness, lassitude, uneasiness, distension of the stomach, or an inclination to sleep, he has exceeded the bounds of prudence, and should be on his guard in future. Partaking of a great variety of food at one meal, is injurious; it causes more to be eaten than is proper, impedes the digestive powers of the stomach, and inflicts serious injury on the latter organ, and through it, on the system generally. With respect to the solid or fluid nature of our food, we may remark, that a certain degree of solidity assists its digestibility, and hence, soups, jellies, gravies, and the like, are more readily digested when bread or other solid substance is added to them than when they are eaten alone. A sufficient bulk of food in the stomach to give it a gentle stimulus and distension is absolutely necessary for healthy digestion: it is on this account that all such articles as contain much nutriment in a very small space are unwholesome. In regard to the concentration of aliment, very erroneous and injurious opinions generally prevail. It is supposed by most persons, that by extracting and insulating what they conceive to be the nutritious principle or principles of any given alimentary substance, they are able, with greater certainty and effect, to nourish the body of the sick and delicate; thus, we continually hear of strong beef-tea, pure arrow-root jelly, and the like, being prepared with great care for such persons. But many of our readers will be much surprised to hear, that dogs and other carnivorous animals fed on the strongest beef-tea, or pure jelly alone, rapidly emaciate, and die within a short period, and that precisely the same consequences would ensue were the strongest man confined to the same food. A certain bulk, therefore, of food taken into the stomach is essential to nutrition; and all attempts to combine too much nutrition in too small a mass, materially impair the wholesomeness of our food.

Aliments.—Whatever is capable of being used as food, and of supplying the waste of the animal body, is called aliment. The great variety of nutritive substances may be classed and arranged in various ways, as animal or vegetable; fish, fowl, or flesh; solid or liquid, etc.; or they may be classed according to the particular principles, as they are called by chemists, on which the nutritive qualities depend. Some of these principles are fibrin, albumen, gelatine, oil and fat, gluten, fecula or starch, mucilage, sugar, acids, etc. On this plan, Dr. Paris classes aliments in the following way: Class I. Fibrinous aliments. Comprehending the flesh and blood of various animals, especially such as have arrived at puberty—venison, beef, mutton, hare. II. Albuminous aliments. Eggs; coagulable animal matter. III. Gelatinous aliments. The flesh of young animals, veal, chicken, calves' feet, certain fishes. IV. Fatty and oily aliments. Animal fat, oils, and butter, cocoa, etc., ducks, pork, geese, eels, etc. V. Caseous aliments. The different kinds of milk, cheese, etc. VI. Farinaceous aliments. Wheat, barley, oats, rice, rye, potato, sago, arrow-root, etc. VII. Mucilaginous aliments. Carrots, turnips, asparagus, cabbage, etc. VIII. Sweet aliments. The different kinds of sugar, figs, dates, etc., carrots. IX. Acidulous aliments. Oranges, apples, and other acescent fruits.

The numerous substances classed above vary much both in their nutritive and digestible properties. When we talk of a substance being nutritive, we mean that it has the power to supply more or less nourishment to the body, without saying whether the stomach and the other assimilating organs find much or little difficulty in conducting the process; and when we say that a substance is digestible, we mean that the stomach and its coadjutors separate with ease the nutritive portion from it. Thus a substance may be very nutritive but not very digestible; and the reverse may also be true. Fat, oily aliment is very nutritive, but of difficult digestion. This is what people mean when they say such an article of diet is *heavy*, though oil is specifically light, and often floats on the other contents of the stomach. The digestibility of food, considered without reference to the stomach, depends on a variety of circumstances, particularly the state of the food, with regard to texture and consistence; and this texture in animal food depends on the time that has elapsed since the animal was killed, on its age, feeding, and mode of killing; and above all, on the operations of cookery. In a matter which varies so much in different individuals, it is not easy to lay down any general maxims with regard to the digestibility of different kinds of food; but it is found pretty generally to be the case, that tender mutton is the most digestible food. Beef is not quite so easily digested; but it is equally nutritious. Soups, oils, and jellies are digested with some difficulty, both on account of their tenacity, and because they are not so easily acted upon by the mechanical and solvent powers of the stomach.

Vegetable Food.—That man is capable of sustaining the health, vigor, and strength of his system upon a diet purely vegetable, is established by so many proofs, as to place the fact beyond the possibility of a doubt. The Hindoo lives almost exclusively upon rice and water. A great proportion of the Irish peasantry subsist on potatoes, with the occasional addition of bread and milk; and the laboring classes in many districts of Scotland and the north of England are nourished upon little else than oat-meal and potatoes; while in various other countries of Europe, the poor are restricted almost exclusively to a vegetable diet, even less nourishing than either of these. When the food just referred to is in sufficient quantity and of a good quality, more robust, active, and vigorous frames, and a greater amount of general health than are presented by the individuals who make use of it can scarcely be met with in the inhabitants of any other country, or among any other classes of society, whatever may be the nature of their diet. Although vegetable aliment requires a longer time to digest in the stomach than that from the animal kingdom, and notwithstanding the latter presents a larger amount of nutritive matter in a smaller bulk than the former; yet it is indisputable that the human system can derive from vegetable food as great a quantity of suitable nourishment as from animal, while the former produces much less excitement and heat, and is far less liable to produce overfullness of the blood-vessels, or to predispose the organs to disease. As a general rule, it will be found that they who make use of a diet consisting *chiefly* of vegetable substances, properly cooked, more especially the farinaceous seeds and roots, have a manifest advantage in looks, strength, and spirits over those who partake largely of animal food; they are remarkable for the firm, healthy plumpness of their muscles, and the transparency of their skins. This statement, though at variance with popular opinion, is amply supported by experience. The diet of children, and young persons generally, should consist almost exclusively of farinaceous aliment and milk. In summer, and in warm climates, a greater proportion of vegetable food is required than in winter and in cold climates. They who, with a sufficiency of daily exercise in the open air to preserve the activity of the digestive organs, nevertheless spend ordinarily a life of ease and comparative inaction, will find their health and comfort better promoted by a diet principally vegetable, than by one in which animal food abounds. Toward the decline of life, also, the amount of animal food should be gradually diminished, and that of wholesome vegetable aliment increased.

Animal Food.—It is evident, as well from the structure of the digestive organs in man as from experience, that he is destined to live upon both animal and vegetable food, and that a proper combination of both constitutes the aliment which, generally speaking, is best adapted to his taste, and the one by which the health and vigor of his system is under most circumstances best sustained. It is nevertheless true, that whole tribes of people subsist almost entirely upon the flesh of animals, without apparently its producing any striking influence upon their bodily strength, or inducing disease; while, on the other hand, we know, that by a diet almost exclusively vegetable, the growth and development of the body is in no manner curtailed, and its muscular strength and freedom from disease are as fully maintained as it can be by any other species of food.

The nourishment communicated by both animal and vegetable food is much the same; but the animal product is the most easily separated by the digestive organs, and is afforded in the greatest amount. The blood of the individual who partakes largely of animal food is hence richer, more elaborated and stimulating, and produces a much greater excitement of the different organs of the system than the blood of those fed principally upon a vegetable aliment. The first gives, likewise, a greater tendency to inflammatory affections than the latter. For those who are accustomed to active and laborious employments a greater amount of animal food will be proper than for the sedentary and inactive. Infants require less animal food than children, children than adults, and women than men. In summer, the quantity of animal food should always be diminished, whatever may be the habits or occupations of the individual. In winter, and in the more northern climates, a more permanent and stimulating nourishment is required than under opposite circumstances; this is best afforded by animal food; and hence the propriety of the latter being increased to a certain extent during the cold season and in cold climates. The different kinds of animal food differ in the degree of nourishment they afford, as well as in the ease with which they are digested. Thus, the flesh of full-grown animals is much more digestible and nutritious than that of their young; and as it respects the larger animals, this rule is without exception. Beef and mutton, for example, are more easily digested, and more wholesome than veal and lamb. The sex of animals, too, influences the nature of the food; the flesh of the female being more delicate than that of the male. The mode of killing, too, gives a tenderness to the flesh. Hunted animals are hence tenderer than those that are killed on the spot. The flesh of animals which are allowed to range freely in the open air is more wholesome and nutritious than of such as are stall-fed. In general, the flesh which is dark-colored, and which contains a large proportion of fibrin, is more digestible and nutritious than the white flesh of animals. Thus, the white flesh of domestic fowls is not so readily dissolved in the stomach as that of the different kinds of game. By cooking, animal food is changed in its texture, being generally rendered softer and easier of digestion; but by certain modes of cooking a reverse effect is produced, the food being rendered indigestible, unnutritious, and unwholesome.

VARIETIES OF ANIMAL FOOD.—Gelatine, or animal jelly, is highly nutritious; but in its separate or concentrated state it is difficult of digestion; hence, the impropriety of the dyspeptic, and persons of weak stomachs generally, being fed upon strong soups, calves'-feet jelly, and similar articles of food.

Gelatine of Bones.—Bones have been found, by careful analysis, to contain in every one hundred parts sixty of an earthy matter, and thirty of a nutritive jelly, a portion of the residue being pure fat. By a process lately invented by Mr. Darcet, of Paris, the whole of the nutritive part of bones can be extracted from the other substances contained in them, and, with the addition of proper seasoning, and such vegetables as ordinarily enter into the composition of good soups, it constitutes a highly palatable and nutritious food, which, from its cheapness, is well adapted for the use of the poor; and is now extensively employed in several of the public charitable institutions of France. In preparing the jelly from bones, it is only the spongy extremities, and the soft cellular portions of them, that are made use of. The hard, compact bones are still, therefore, reserved for the various purposes to which they are now so extensively applied in the arts. Not only does the jelly procured from bones deserve attention by its affording a palatable and economical soup for the supply of the poor; but from the facility with which it can be converted into dry cakes, and in that form kept, without undergoing the least change, for years. The crews of ships, destined for long voyages, can, by this means, be constantly supplied with wholesome fresh food; all that is required to convert the cakes of dry jelly into soup, being to dissolve them in boiling water, and to add the proper seasoning, with biscuits, rice, potatoes, or any other vegetable aliment that can be obtained. Biscuits are also made with the jelly, combined with flour. These biscuits have been introduced as an article of diet on board the French national vessels, with decided advantage to the health and comfort of their crews.

Calves'-Feet Jelly.—A jelly obtained by boiling calves' feet in water for a length of time. The decoction being properly strained and clarified, is allowed to cool, in the form of a pure jelly; or, previously to its cooling, sugar, wine, spices, etc., are added to it. Plain calves'-feet jelly, or that which is sweetened, is grateful to the palate, very nutritious, and not very difficult of digestion; hence it is, sometimes, a useful article of diet for convalescents; it may be taken cold, or dissolved in warm water, according to circumstances. It should, however, only be given occasionally, or in moderation; for jelly, like all other concentrated aliment, is not so readily converted into chyle as many other articles which contain a less amount of nutriment. Dyspeptics, especially, will find it to disagree very generally with their stomachs. The addition of wine and spices to the jelly renders it an improper article of diet under most circumstances.

Albumen.—The purest example of albumen is that presented by the white of the egg; it, nevertheless, enters largely into the composition of many of the animal fluids and solids. As an article of food, it is at once readily assimilated in the stomach, it being taken up by the absorbent vessels, without its being required to undergo digestion, while at the same time it is highly nutritious. It was once supposed, that when coagulated by heat, its digestibility was, in a great measure, destroyed; this, however, has been proved by late experiments not to be true; the white of a boiled egg being converted into chyme without difficulty. The injurious effects resulting from the eating of hard-boiled eggs are occasioned in a great measure by the effects of the heat upon the oily matter of the yolk.

Milk.—Milk is confessedly one of the most valuable presents which a bountiful Providence has bestowed upon man. To the healthy and active it affords far more strength and support than is generally supposed. In many instances, either alone, or in combination with the farinaceous seeds or roots, it has formed the sole sustenance of life—maintaining fully the health and robustness of the system, without any of the disadvantages which result from an excess of animal food on the one hand, or the diminished strength and vigor which have been supposed to be the effect of a purely vegetable diet, on the other.

Incalculable would be the benefits which would result to the working and laboring classes of our country were they to substitute this wholesome and nourishing food in their families, for the expensive and unnutritious slops which, under the name of tea or coffee, constitute the chief of their morning and evening meals; or, at least, were they, in order to support their system under labor, and to defend it from the effects of cold, heat, or fatigue, to substitute a tumbler of milk for the pernicious dram of ardent spirits, or the too often deleterious preparations presented to them in the form of beer, porter, or ale.

For children, milk with bread, or a simple preparation of milk with rice, or with eggs and sugar, is perhaps the best and most wholesome food that can be devised: it should, at least, form the principal part of their nourishment for the first twelve or fifteen years of their life. In place of being weakly or stinted in their growth upon such food, they will be found stronger, stouter, more healthy, and of a more rosy and pleasing complexion than children who are fed upon meat, and pampered with the delicacies of a well-filled table.

Milk, to be perfectly wholesome, should be drawn from sound, young animals, supplied with a sufficiency of their natural food, and allowed free exercise in the open air. The best mode of using it is undoubtedly in its raw state, and when it has stood about two hours after being drawn. It may be eaten with bread or mush. Milk enters, also, into the composition of various dishes, which it is not necessary here to enumerate, they being well known to every skillful housewife.

Largely diluted with water, milk furnishes also a very palatable and wholesome drink during warm weather.

Cream.—That portion of the milk which rises to the surface, when it has stood for some hours, and may be skimmed off and separated from it. It has many of the properties of oil; when allowed to stand for some days, it becomes thicker, the flavor of cream is lost, and is succeeded by that of cheese. When cream is agitated by churning, it separates into butter, and a fluid like skimmed milk. With some stomachs cream disagrees in the same manner as a small quantity of oil or butter would do; with many dyspeptics, pure cream, however, agrees better than milk. When taken in moderate quantity, as an accompaniment to tea, coffee, fruits, etc., it seldom gives inconvenience to any one.

Eggs.—Eggs contain a great deal of nourishment in a small bulk; and when perfectly fresh, and soft-boiled, they constitute a species of food of very easy digestion. When hard-boiled, and especially when fried, they are indigestible and stimulating, and produce very considerable disturbance to weak stomachs.

Cheese.—All kinds of cheese are of difficult digestion; and, as an article of food, are suited only to the healthy, strong, and laborious. Such persons would, in fact, appear to require an aliment which, while sufficiently nourishing, is not rapidly digested. We have now reference to cheese in its recent state, or which has been preserved in such a manner as to undergo but little change. With age, cheese, in general, acquires new properties, becoming more stimulating and less nutritious. This arises from a spontaneous decomposition which takes place in it, by which a certain amount of ammonia, and of other salts, is developed. It is this which gives to it its peculiar sharpness, and, in some measure, its taste and smell. In this state, cheese can with safety be made use of, only in very small quantities, as a condiment along with other food. By persons of delicate stomach, it should be eaten with great caution. The idea entertained by many, that a portion of old cheese taken with the dessert aids digestion, is perfectly absurd. When cheese has advanced very near to a state of putrefaction, though eaten by certain epicures, and by some of the nations of the north of Europe, it is at once disgusting to the senses and injurious to the stomach. Certain changes which cheese occasionally undergoes, impart to it poisonous properties. Roasted, or cooked cheese, is very indigestible, and liable to occasion painful sensations in the stomach, headache, acrid eructations, feverish heat of the skin, and disturbed sleep. A few persons have a decided aversion to cheese, so that it can neither be seen, smelt, or tasted by them, without exciting nausea, or vomiting. Cheese is an article of diet not well suited to children; it is very apt, in their excitable systems, to give rise to unpleasant symptoms of longer or shorter duration. When eaten by adults, it should always be combined with a large portion of bread.

Butter.—An unctuous substance obtained from the milk of animals, and most plentifully from that of the cow. It is got by long-continued agitation, which operation is called churning. It is universally used as an article of diet; and, when perfectly fresh and thinly spread upon bread, there are few stomachs with which it disagrees. Butter is used as a sauce to many articles of food, and is frequently added to flour to be baked into cakes and pastry, and it is in both these forms injurious, for, though it does not produce effects that are immediately apparent, it lays the foundation of stomach complaints of the greatest obstinacy. Its use in this form is also very apt to give rise to diseases of the skin, very difficult to cure. Persons laboring under stomach complaints should not use much butter in any form. It is also very unwholesome when heated. It is a bad part of the management of children to pamper their palates by frequently indulging them with butter, as it is apt to give rise to a gross and unhealthy habit of body, characterized by the frequent appearance of boils and other sores, discharges from behind the ears, etc., or eruptions on the head and other parts of the skin. Its immoderate use also occasions too great fullness of the system. Butter, when rancid, is peculiarly unwholesome and disagreeable.

Fat affords a rich nutriment, requiring, however, strong powers of digestion, and hence, adapted only to the healthy and laborious; it is more wholesome, however, when eaten with a proper quantity of lean, or with a considerable addition of farinaceous aliment in the form of potatoes, bread, rice, etc. To persons with weak stomachs, fat is too heavy and stimulating, and is apt with them to turn rancid, and to produce uneasiness and disease of the digestive organs. When partly burned, as in roasting, or frying, fat is decidedly unwholesome. Children and invalids, especially, should be extremely cautious in the use of fat meats.

Beef.—Beef affords a strong, easily-digested, and wholesome nourishment; it should be tender, fat, and well mixed; and taken from a bullock of middle age.

Beef is more generally acceptable to the taste than most other species of animal food; it is good at all seasons, and we continue longer to relish it without disgust than any other kind of meat. The particular flavor and delicacy of beef depend much upon the feed on which the animal is reared. Beef furnishes proper food for the strong and laborious; when eaten to excess, however, it predisposes to inflammation, and an over-fullness of habit. Of its different parts, the *fat* is less easily digested than the lean; the *tongue*, and also the *tripe*, being of a more dense texture than the other parts, are more indigestible, and therefore an unfit aliment for weak stomachs. The best mode of preparing beef is by roasting or boiling. Beef-steaks appear to be the form, however, in which its nutritious qualities are best retained.

The excessive body of fat which is accumulated upon what is called *prize beef*, adds nothing to its goodness, but, on the contrary, renders it less wholesome and nutritious.

Beef-tea is an important restorative for persons recovering from sickness, and in many cases of actual sickness. The following is the best mode of preparing it: cut a pound of lean beef into thin slices, put it into a quart and a half of cold water, set it over a gentle fire, so that the water shall become gradually warmed. When a scum arises, skim it off. Let it simmer gently for about an hour, then strain it through a fine sieve, or napkin. After it has stood about ten minutes to settle, pour off the clear liquor.

Mutton.—Mutton is a highly nutritious and wholesome meat. It appears to be the most digestible of all animal food, and is perhaps more universally used than any other. The flesh of the male animal, however, has in general so strong and disagreeable a taste, and is, besides, so exceedingly coarse, and difficult of digestion, that it is only adapted to persons of strong digestive powers. *Ewe-mutton*, if it is more than between three and four years old, is likewise tough and coarse. *Wether-mutton*, or the flesh of the castrated animal, is most esteemed, and is by far the sweetest and most digestible.

Lamb being less heating, and less dense than mutton, is better suited to persons convalescent from acute diseases; but by the majority of patients laboring under indigestion, or any other severe affection of the stomach, it is not found so digestible or proper a diet as wether-mutton. It is, however, to persons in health a light and wholesome food, especially when the lamb is not killed too young. A lamb that has been allowed to suck five or six months, is fatter and more muscular, and in every respect better than one which has been killed when two months old, and before it has had time to attain its proper consistency. *House-lamb* is a dish esteemed chiefly because it is unseasonable. Like all animals raised in an unnatural manner, its flesh is depraved and unwholesome.

Venison.—The flesh of the deer is reckoned a great delicacy; it is nutritious, savory, and easy of digestion. The animal being commonly killed in the chase, its flesh, like most species of game, is more tender than that of tame beasts slaughtered in the usual mode.

Veal.—The flesh of the calf, like that of all young animals, abounds in gelatinous matter; it is far less easy of digestion than the flesh of the ox or beef. For persons in health, the most proper mode of cooking veal is by roasting or baking.

Veal-broth produces a laxative effect upon the bowels, and is hence a very suitable food for persons troubled with costiveness.

Pork.—Good pork is unquestionably a very savory food, and affords strong nourishment, well suited, as an occasional diet, to persons who lead an active or laborious life, but it is not easily digested, nor can it be considered so wholesome as beef or mutton. The too frequent and long-continued use of this meat favors obesity, and is apt to disorder the stomach and bowels, and occasions eruptions upon the skin. When salted, or dried and smoked, pork is still more indigestible, and less nourishing, as well as less wholesome; with some delicate people it immediately affects the bowels in rather a violent manner. The flesh of the sucking pig is reckoned a great delicacy; but it is digested with much difficulty. It produces very considerable disorder of the digestive organs of such individuals as are weak or sickly. Pork should be avoided by the dyspeptic, by the sedentary generally, and by all those who are liable to affections of the skin and bowels, or who are inclined to excess of fat.

Bacon.—Pork salted, dried, and sometimes smoked. Bacon is in general prepared from the flesh of the flanks and sides of the full-grown hog. It is a strong, very indigestible, and stimulating food, adapted only to persons of a robust frame, and accustomed to laborious occupations. The best mode of cooking bacon is by boiling it with vegetables. When fried with eggs it is decidedly unwholesome.

Ham.—The thigh of the hog salted, dried, and smoked. When properly cured, and when boiled, ham is a very palatable and wholesome food. It is, however, stimulating and difficult of digestion, and hence only suited to such persons as are in full health and exercise much in the open air. Fried ham is still more indigestible than that which is boiled; it should be carefully avoided by dyspeptics, and weakly and sedentary persons generally.

Sausages.—A very common article of food, prepared in this country chiefly from pork, chopped fine, with the addition of pepper and various other spices, and often highly flavored with garlic. They are sometimes eaten fresh, at others they are dried and smoked. The sausages imported from the north and south of Europe are prepared from the flesh of various animals boiled. In whatever form they are eaten, sausages are an indigestible and unwholesome food, fitted only for the stomach of the most robust. Sedentary persons and dyspeptics should avoid them entirely. When sausages have been long kept, particularly in a damp place, they are apt to undergo certain changes, in consequence of which they become poisonous.

Game.—Game, or such birds and beasts, adapted for food, as are allowed to enjoy their natural habits and modes of living, and are killed by fowling or hunting, are in general wholesome. When plainly cooked, they are more readily digested than the same species of animals domesticated and killed in the ordinary manner.

Poultry.—Poultry, in the common acceptation of the term, includes all the domesticated birds used as food, as the common fowl, turkey, duck, and goose. In point of digestibility they rank nearly in the order we have enumerated them. The domestic fowl and turkey are also the lightest and most wholesome. The duck and goose are the most difficult of digestion, the most stimulating, and hence the most apt to disagree with persons of weak stomachs and irritable habits.

Chicken soup.—Chicken soup, when properly prepared, is a light food, adapted to many invalids, and to persons convalescent from fevers. For their use it should be prepared from the fleshy or lean parts of the chicken well boiled in water, with a little salt, the scum and fat being taken off as it rises. The addition of broken crackers, or of rice or barley, may be made, according to circumstances. To many palates the peculiar flavor given to the soup, by plunging in it a slice of toasted bread, is extremely agreeable. Highly-spiced chicken soup is liable to the same objections as all high-seasoned food.

Fish.—Fish are less nutritious than the flesh of warm-blooded animals, while to most stomachs they are more difficult of digestion. That they afford, however, sufficient nourishment to support the general health and vigor of the constitution, is proved by the condition of entire communities that subsist upon little else. Fish, however, especially some particular kinds, and in certain constitutions and states of the stomach, produce very considerable uneasiness, some febrile excitement, and a rash or eruption on the skin. When used habitually, there can be little doubt that they are apt to induce diseases of the skin and disorders of the bowels. The fat of fish is still more indigestible than that of other animals, and readily turns rancid on the stomach. In certain climates fish possesses a poisonous property at particular seasons, and when not in season, all kinds of fish everywhere are very indigestible and unwholesome. The best mode of cooking fish is by boiling; stewed or fried fish are very indigestible. Salted and dried fish are a still more unwholesome food than such as are eaten fresh, and should therefore be avoided by all excepting the healthful and laborious, and even by them should be taken with great moderation. Butter and the acid fruits form improper sauces for fish, causing it almost always to oppress and irritate the stomach; nor should fish and milk ever be taken at the same meal; this combination has frequently occasioned severe bowel complaints.

Salt-water fish are the best, as their flesh is more solid, more agreeable, less liable to putrescency, and less viscid. They possess these desirable qualities when fresh; when salted, they have all the properties of other salt fish, and consequently its disadvantages. Those fish which have scales are in general the most easily digested and the best; and of all these the fresh herring, shad, trout, perch, whiting, sole, cod, turbot, and flounder are perhaps the most wholesome. Salmon, mackerel, skate, and sturgeon, with lobster, and most other kinds of shell-fish, are digested with difficulty, and are, generally speaking, unwholesome.

Salted Meat.—Salted meat is more difficult of digestion than that which is eaten fresh, from the increased firmness of its texture; it is also less nutritious, both from the pickle in which it is immersed washing out, as it were, a considerable amount of its nutritive parts, and from the chemical change which it always undergoes to a greater or less extent. When used as food, salted meat should always be well boiled, and eaten with a large quantity of vegetable aliment.

Crabs and Lobsters.—Crabs and lobsters, in whatever manner cooked, are indigestible and decidedly unwholesome. In certain persons they produce effects which might lead a person who is unaware of the fact, to believe that poison had been administered. Thus they sometimes cause a burning sensation in the throat, pain in the stomach, and eruptions on the skin. In other instances, violent vomiting and purging have followed the eating of them. When taken in excess, they have caused stupor, insensibility, and all the other phenomena of apoplexy.

Turtle.—The flesh of the turtle, when plainly cooked, is a wholesome, palatable, and nourishing food—when, however, it is converted into soup, with an excess of spices, force-meat balls, and other pernicious articles, it is productive of not a little injury to the stomach and to health generally.

Mussels.—The mussel—*mytilus edulis*—a shell-fish often used as food, is highly indigestible and unwholesome. It is apt, in certain individuals, to occasion violent affections of the stomach and bowels, restlessness, and agitation, and an insupportable itching, with eruptions on the skin; at some seasons of the year, and under particular circumstances, these effects are produced in all who eat of them.

Oysters.—Oysters, when taken raw or after being slightly cooked by roasting, are a light, nutritious, and easily-digested food. The hard white part, or eye, as it is sometimes termed, should always be rejected. When thoroughly cooked, however, particularly when stewed or fried, oysters constitute on the other hand, one of the most indigestible and pernicious articles of food in ordinary use. Eaten to excess in this form, they give rise frequently to the most violent and dangerous symptoms. When out of season, oysters are always unwholesome. To some stomachs, oysters invariably prove injurious, causing the same train of symptoms as were noticed when speaking of mussels. The juice of the oyster, thickened with grated biscuit and warmed, is sometimes an excellent diet for persons laboring under great delicacy of stomach. Salt-water oysters should always be preferred to such as breed in rivers.

Soups.—For the laboring classes generally, there is scarcely a more wholesome and economical article of diet than soup. We allude now to the ordinary domestic soups, prepared from beef, mutton, or veal, with the addition of various vegetables. The more fashionable dishes, served at table under the name of soups, are merely refinements in cookery, adapted to render the articles of which they are composed as indigestible and stimulating as possible. They can be received, therefore, in no other light than as provocatives to appetite, and inducements to partake of food beyond the powers of the stomach and the wants of the system. In the preparation of soup, the meat and vegetables should be well boiled, and whatever seasoning is added to increase the flavor, care should be taken that it be not thereby rendered too stimulating. Potatoes, rice, and barley, as well as broken crackers or stale bread, form a wholesome addition to soup. The combinations of flour and butter, which are sometimes met with in soups, under the denomination of dumplings, are highly indigestible and improper. Soup should always be eaten with bread; this gives it that degree of consistency which, in all our food, appears to cause it to be the most readily acted upon by the stomach.

Many suppose that soups generally are calculated only for those whose powers of digestion are weak; but this is a mistake, the reverse being generally the case. When the digestive powers are weak or deranged, it will almost always be found that solid aliment agrees the best, particularly solid animal food; this the stomach seems to digest with ease and in a very short time; whereas, liquid food is apt, in such cases, unduly to distend the stomach, and to require a greater strength of digestive power for its perfect assimilation.

Broth.—A term generally applied to the fluid in which meat has been boiled for a long time, with a slight addition of salt—this, with bread, forms often an excellent diet for persons to whom we wish to communicate nourishment, without exciting to any extent the digestive organs, or increasing the heat of the system.

VARIETIES OF VEGETABLE FOOD.—Vegetable Gluten.—This is one of the proximate principles of vegetables; it is contained in all the farinaceous seeds, and in many of the fruits, leaves, and roots of various plants. It is the principle which imparts to flour the property of fermenting and making bread. Of the nutritive properties of gluten, distinct from its other vegetable principles, we know but little. The superior nutritious powers of wheat flour, which contains a greater abundance of gluten than all the other farinaceous substances, sufficiently prove, however, that in combination with starch it is highly nourishing.

Starch.—Another of the proximate principles of vegetables; it is obtained from all the farinaceous seeds and roots. Of its nutritive properties there can be no doubt, though it is seldom used in a separate state as food. It is often administered boiled in water, as an article of diet during sickness, and is one of our best demulcents in various diseases of the bowels.

Gum.—The vegetable gum obtained from the Egyptian acacia, the gum-arabic of the shops, and from the plum, cherry, and other fruit-trees, is highly nutritious. Whole caravans passing through the deserts have subsisted upon it alone, preserving at the same time a sufficient degree of vigor and strength. Gum is seldom, however, made use of as an aliment. Dissolved in water, it is largely used as a demulcent drink for patients laboring under irritation and inflammation of the stomach, and in all the febrile affections and diseases of the bowels it is almost the only drink or diet that should be allowed.

Arrow-Root.—The root of a tree—*Maranta arundinacea*—cultivated in the West Indies. It derives its name from being used by the Indians to produce the poison communicated to arrows, though it is not easy to believe it possessed of that power. A starch is obtained from this plant by the following process: the roots, when a year old, are beaten to a pulp in a large wooden mortar; this pulp is well stirred in a large tub of clean water, and the fibrous part is wrung out, and thrown away. The milky liquor being passed through a hair-sieve or coarse cloth, is allowed to settle, and the clear water is drained off. The white mass is again mixed with clean water, and drained; it is next dried in the sun, and is then a pure starch, as it is sold in the shops. The arrow-root contains in a small bulk a great proportion of nourishment. Boiled in water, it forms an excellent nutritious jelly, well adapted for invalids and for children. The following is the method of preparing it: Take a dessertspoonful of the powder, and add as much cold water as will make it into a paste; to this add eight ounces of boiling water, stir it briskly, and boil it for a few minutes, when it will become a clear, smooth jelly. To this may be added a little milk and sugar, with a little nutmeg to make it sit light on the stomach; or for children a little of the sugar of anise, or a few drops of the essence of caraway-seeds, or of cinnamon.

Sugar.—Sugar is a peculiar and well-known vegetable substance, procured chiefly from the *saccharum officinarum*, or sugar-cane, but yielded abundantly by various other vegetables, and contained in the greater part of the fruits in their ripe state. Sugar is highly nutritive, and, when eaten in moderate quantities, is perfectly wholesome. It is apt, however, when eaten by itself in excess, to become quickly sour, or to produce sickness and nausea. Combined with other alimentary substances, it forms a useful and important article of food to all classes—so much so, that it may now be ranked as one of the chief necessaries of life. The idea entertained by many of its injuring the teeth, is unfounded.

Molasses has, as an article of diet, nearly the same properties as sugar. It is merely a syrup, in which the sugar is mixed with a quantity of mucilage and other vegetable matter, and more or less water.

Sugar-plums.—We merely notice these articles in order to point out to parents the fact, that in common with most of the sugar toys sold to children, they often contain a quantity of plaster of Paris, which, being insoluble, must be dangerous, if it accumulates in the bowels. Many of them are also covered with preparations of arsenic, copper, lead, and other poisonous paints, which, though in very minute quantities, nevertheless produce more or less of an injurious effect upon the stomach.

Honey.—Honey very much resembles sugar in its alimentary properties; it is very nutritious, and when eaten in moderation with bread, is perfectly wholesome. Like sugar, however, it readily ferments, and when the stomach is delicate, it is apt to occasion griping and irritation of that organ and of the bowels, accompanied with considerable looseness.

Oil.—That obtained from the olive, by expression, is the only vegetable oil used in this country as food. It is highly nutritious, but being difficult of digestion, is oppressive and irritating to a weak stomach. When used in cooking other articles of food, it becomes extremely unwholesome. In moderation, provided it be perfectly free from rancidity, pure olive oil, combined with vegetables, may be taken without injury by persons in health and of active habits.

Wheat.—Wheat, the *triticum hybernum* (and other species), of botanists, has been cultivated from time immemorial in Europe, in Asia, and in the northern parts of Africa, and the seeds employed as one of the most important and wholesome articles of food. Indeed wheat flour is the only substance known from which good loaf bread can be made. In its nutritive properties and wholesomeness, it stands before almost all other of the vegetable substances used as food. The seeds of the wheat, when ripe, are ground to a fine powder, and by passing this powder through cloth sieves of various degrees of fineness, it is separated into distinct portions. The fine flour constitutes the greatest portion; and the bran, which consists of the outer coat of the seed, the next greatest portion.

Bran.—The husks or shells of wheat, which remain in the bolting machine. It contains a portion of the mealy matter; and a decoction of it is used as a drink in febrile diseases. This decoction is made by boiling a pint of water with two ounces of bran, till only three-quarters of a pint remain, and then straining it. It is thought to have something of a laxative quality.

Rice.—The seeds of the *oryza sativa*, an excellent grain much used in the East, and answering with them the same purposes as bread with us. When mixed with other food, it furnishes a wholesome article of diet, as it is not disposed to become sour, or to ferment in the stomach; but if it be taken in too great a quantity, as it is not very stimulating, it is apt to remain long in the stomach, especially if it has been much boiled. Rice, simply boiled, is an excellent vegetable to be eaten with roasted or baked meats. Baked or boiled with milk, eggs, and sugar, it affords also a very light, wholesome, and palatable food. Rice is supposed to be in some degree astringent; and in looseness of the bowels, the water in which it has been boiled forms an excellent drink. By its mild mucilaginous properties it aids greatly also in allaying irritation in all diseases of the bowels.

Oats.—The *avena sativa* of botanists. The meal obtained by grinding the grain of oats affords a wholesome and nutritious food, upon which many persons almost entirely subsist in Scotland, Ireland, and the north of England. It is generally used boiled with water, in the form of gruel, or made into thin cakes, which are baked or roasted without their undergoing fermentation. Bread made from oat-meal fermented in the usual way, is neither palatable nor easily digested.

Gruel.—By gruel is generally understood oat-meal boiled in water. It may be made thin or thick, according to the circumstances under which it is resorted to as a diet, by the addition of a smaller or larger quantity of the meal. It is a wholesome and nutritious food for children and delicate persons, and is better adapted as an article for the supper of such than either tea or coffee. When desirable, it may be rendered more nutritious by the addition of milk and sugar; and its flavor may be heightened by the addition of a little grated nutmeg. Thin plain oat-meal gruel, or a gruel made in the same way from Indian meal, is a useful diet for convalescents from febrile diseases, and for those who have committed an excess in eating.

Rye.—The rye (*secale*) affords a meal, the food prepared from which, though less nutritious than wheat, is nevertheless wholesome and sufficiently nourishing. Rye bread is more difficult, however, of digestion, and being apt to turn sour in the stomach and to irritate the bowels, it is not so well adapted as wheat for the use of sedentary and delicate persons. The grains of rye are occasionally subject to a peculiar disease termed *ergot.* When in this state, eaten in any quantities, or for any length of time, it is peculiarly unwholesome, and apt to occasion diseases of a very serious nature. Bread made of a mixture of rye and wheat is more palatable, and in other respects better than when made entirely of rye.

Barley.—The *hordeum distichum* of botanists. An annual plant, cultivated in almost every country of Europe. *Pearl barley* is prepared by grinding off the husks of the grain, and forming the latter into little round pellets of a pearly whiteness. Barley forms an excellent article of nourishment when boiled in water or made into cakes. Barley bread is not, however, a very pleasant or wholesome food.

Barley-water.—The water in which barley is well boiled forms one of our best drinks in various febrile and other diseases. We annex two receipts for its preparation.

1. Take a couple of ounces of shelled barley, wash it clean with cold water, put it into half a pint of boiling water, and let it boil for five minutes; pour off this water, and add to it two qnarts of boiling water; simmer to two pints, and then strain.

2. The above is simple barley-water; to a quart of this is frequently added two ounces of figs, sliced; the same quantity of raisins, stoned; half an ounce of liquorice, sliced and bruised; and a pint of water. Boil till it is reduced to a quart, and strain. These drinks are intended to assuage thirst in fevers and inflammatory disorders, for which plenty of a mild diluting liquid is one of the chief remedies demanded by honest instinct in terms too plain to be misunderstood.

Maize, or Indian Corn.—The meal made by grinding Indian corn, prepared in various ways, but especially when made into mush, or with the addition of wheat flour baked into bread, furnishes a most wholesome, nourishing, and palatable food, and one well adapted for the support of the active and laborious generally. Indian bread, properly prepared, were it not from habit and fashion, would recommend itself to every palate by its agreeable flavor, and the beauty of its appearance; it is far preferable to the ordinary bread made from wheat alone. To make this bread a mush should be made of the Indian meal in the usual way; into this, when cold, with the addition of a very small quantity of warm water, and a little salt and yeast, is to be kneaded a sufficiency of wheat flour to make it into a paste; when sufficiently raised, it is to be again kneaded, and baked in the same manner as bread.

Buckwheat.—The flour, or meal, furnished by the seeds of the buckwheat is incapable of being converted into a wholesome, palatable bread. As an article of food, it is generally used in the form of cakes, made by baking the meal, made into a thin paste with water, and properly fermented. Buckwheat cakes, though extremely palatable, afford little nourishment, and are apt to disagree with delicate stomachs, in consequence of the large amount of melted butter which is eaten with them. They should be avoided, at least by invalids and dyspeptics.

Bread.—Bread is that most important article of diet, made from the farina of various plants. This farina consists of different principles, a mucilaginous saccharine matter, starch, and gluten, which is a peculiar substance, having many of the properties of animal matter. This latter ingredient is most abundant in wheat flour, and gives it its great superiority, as an article of diet and for the manufacture of bread, over that of barley, rye, oats, and other grain. In the making of bread, flour is formed into a paste by mixing it with water, in the average proportion of two parts of water to three of flour; and the older and better the flour, the greater the quantity of water required. If this paste be allowed to remain for some time, a fermentation takes place; and by the action of the ingredients on one another, important chemical changes take place, and alcohol, carbonic acid, and acetic acid, or vinegar, are formed. This paste is what is called *leaven;* and if a portion of it be added to new-made paste, the fermentation begins more speedily, carbonic acid is given off, but the gluten hinders its escape, and, expanding like a membrane, forms numerous little cavities in a light and spongy mass. If there be too much leaven put into the paste, the bread has an unpleasant flavor; and if there is too little, it is compact and heavy. *Yeast*, or the head that collects on the surface of fermenting beer, being added to the dough, makes a bread superior to what is made with leaven; and is in this country generally employed for raising bread. After the dough has been properly raised, it is put into the oven, heated to about the temperature of 448°, and is there baked. Bread is very different from the flour of which it was made; the ingredients of the flour cannot be discovered in it; it mixes more easily with water, and is incomparably more digestible—that is, provided the bread has been properly fermented, and sufficiently baked.

There are three different kinds of bread used in this country,—the fine, the wheaten, and the household bread. Fine bread is made of flour only; wheaten bread, of flour and a mixture of fine bran; and household bread of the whole grain, including both the coarse bran and the fine flour. The finer bread, from its greater quantity of starch, is apt to induce a degree of costiveness, which the coarse bread is enabled to counteract by its admixture of bran. Brown bread, or that made with a mixture of wheat and rye flour, is often usefully prescribed with a view to its laxative effect. As an article of diet, bread is of very great importance, in consequence of its nutritive qualities, and its utility, when joined with other food, both to correct the bad effects of too much animal diet, and to divide the aliment more completely by being intimately mixed with it. The best observations seem to prove that a certain degree of distension of the stomach is necessary to proper digestion; and, consequently, that we could not conveniently feed on essences and jellies, in which the nourishing parts of the food are concentrated into the smallest possible bulk; and that even very rich and nutritive soups are much more readily acted upon by the stomach, when a proper proportion of bread is taken along with them. New bread is particularly unwholesome and indigestible, and should always be avoided, especially by patients troubled with indigestion. The only apparent exception is in the case of new rolls, which healthy stomachs manage to digest pretty well, provided they be well baked, and the crust bears a considerable proportion to the whole. Toasted bread is a very useful article of diet for tender stomachs, and for the diet of invalids. Bread, in some constitutions and diseases, is apt to sour on the stomach, especially in young children, in whom it often produces flatulence and costiveness. Where acidity occurs, biscuit, without butter, should be substituted, or the bread should be toasted.

In the foregoing remarks on bread, we have had principally in view leavened bread from wheat flour; though bread may be made of rye, barley, maize, potatoes, rice, and other substances; and notwithstanding, strictly speaking, biscuits, cakes, and other unleavened mixtures, are entitled to the appellation of bread. Most of the articles last mentioned are sufficiently nutritive, but difficult of digestion, though they are excellently adapted for the powerful stomachs of healthy individuals engaged in laborious and rustic occupations. The addition of butter to such articles before they are baked, causes them to disagree with the stomach, and to make them turn sour or rancid.

A good deal has been said about bread being frequently adulterated. In large communities, some dishonest persons will probably adulterate bread, as well as other articles of food; but the evils of such practices have been much exaggerated. Bean-flour, or potato-flour, have occasionally been mixed with wheat-flour in the making of bread; and alum is very frequently added, to increase its whiteness.

Toast.—Bread slightly toasted, but not burned, is a wholesome diet, especially for persons upon whose stomachs most articles of vegetable food, including bread in its ordinary state, are apt to turn sour. In eating toast, the butter should not be spread upon it until it is cold; the heat of the toast will otherwise produce a change in the butter, rendering it indigestible, and very irritating to the stomach.

Panado.—The crumb of wheaten bread softened with boiling water. It forms an excellent diet for children; for those affected with febrile diseases, and for women during the first days after delivery. It should be sweetened with sugar, and for children, an addition of fresh milk will very generally be proper.

Biscuit.—Bread which is much or doubly baked, as its name imports. It is not fermented, and is not much disposed to become acid in the stomach. Biscuits are, therefore, useful as an article of diet for children, and for those who are liable to acidity of the stomach. Biscuits keep a long time without spoiling; hence, their utility as a part of sea provisions. Those made with butter have all the inconveniences of pastry, and should not be used by such persons as have diseased or weak stomachs.

Gingerbread.—A bread or cake prepared of flour, molasses, and powdered ginger. When well baked, and eaten in moderation, it affords, under many circumstances, a useful stimulus to the stomach. It is an excellent article for individuals going to sea; it being frequently, in cases of sea-sickness, retained on the stomach when every other article is immediately rejected. Travelers, also, on setting out early in the morning, will find that eating a small portion of it will afford a grateful stimulus to the stomach, when they have been obliged to commence their journey without breakfasting. Children, and young, healthy individuals generally, should, however, eat it seldom, and very sparingly; all spices, and other stimulants, save that of a moderate quantity of wholesome food, are to their stomachs unnecessary and injurious.

Pastry.—Pastry, or dough mixed with butter, is used in a great variety of forms, and, though grateful to the taste, is highly indigestible, and injurious to health. Its use is a fertile cause of stomach complaints; it is apt also to occasion an overfullness of blood, convulsions, and diseases of the skin in children; and a tendency to apoplexy and fever in adults. At dinner, in the shape of pies and tarts, pastry is thrown into the already loaded stomach, and the overtaxed powers of that organ are unable to digest what is difficult to manage when they are the most vigorous. To children, pastry is peculiarly unsuitable. Its taste is pleasant, and injudicious fondness is apt to indulge them in it to excess; but those children who use it much, are subject to runnings from the ears, disorders of the bowels, eruptions on the skin, and inflammatory complaints of various kinds. Pastry should be entirely excluded from the nursery-table. The same remarks are true of nearly all kinds of cakes containing butter or lard.

Puddings.—This is a term applied to various preparations of the farinaceous seeds, or vegetables. When composed of flour, or crumbs of bread, combined with suet and dried fruit, they are extremely indigestible, and constitute one of the most unwholesome dishes served at meals. Such puddings should be avoided entirely by sedentary and delicate persons: to the dyspeptic they will prove in the highest degree injurious. Puddings made of batter, baked or boiled, are also indigestible, and unwholesome. Bread-and-milk pudding, as well as rice-pudding, is readily digested, and may be eaten in moderation, without injury. Pudding is also the name given to a kind of sausage made of the liver, or blood of animals, with the addition of fat and certain vegetables and spices. This article is extremely indigestible, and is a suitable food only for the most robust individuals, whose days are passed in laborious occupations in the open air.

Pancakes and fritters.—Cakes made by frying a paste formed of wheat flour and the yolks of eggs, in lard. Although in persons who have active and strong powers of digestion, these cakes may produce little inconvenience, to all others, they will prove indigestible and injurious. By the sedentary and dyspeptic, they should be carefully avoided.

Sago.—Sago is an alimentary substance, prepared from a species of palm. Boiled with water, or milk, sago furnishes an agreeable and nourishing jelly; it is easy of digestion, and excites but little the system; and is, hence, an excellent article of diet for convalescents and for children.

Salep.—Salep is a nutritious substance, obtained from two species of the *orchis*. Boiled in water, or milk, it forms a food which is light, nourishing, and easy of digestion, and, like the arrowroot and sago, adapted for the diet of children and invalids.

Potato.—The root of the *solanum tuberosum*. This vegetable, which was unknown in Europe as an article of food, until about the commencement of the seventeenth century, constitutes an article of diet, which, whether we have reference to the nourishment it affords, the agreeableness of its flavor, its wholesome qualities, and the extent to which it is consumed in this country, as well as in many parts of Europe, is certainly of the greatest importance to man. It is difficult, indeed, to conceive how the poor and laboring classes could have subsisted, or maintained the health of their systems without it. To thousands of them, it at this day supplies the place of bread and of other vegetables, and to an equal number it affords almost their entire sustenance. Potatoes are the lightest and most nutritious of those vegetables which are served at table in their natural state; and, next to bread, the very best accompaniment to every kind of animal food. The dry, mealy kinds are the best, and should always be preferred to those which are hard and waxy. The best manner of cooking the potato, is by boiling, or by roasting. Finely mashed or fried potatoes are indigestible, and oppressive to the stomach. Combined with flour, potatoes are often made into bread, and in this manner, also, afford a cheap and wholesome food.

Sweet potato.—The root of the *convolvulus batata.* The sweet potato, besides a considerable amount of farinaceous matter, contains a portion of a saccharine substance. It is unquestionably highly nutritious; and when simply roasted, or properly boiled, forms a very palatable and wholesome article of food. It does not appear, however, to be so ready of digestion as the common potato. It should, therefore, be eaten in very moderate quantities by persons of weak stomachs.

Yam.—An esculent root, obtained principally from three species of *dioscorea*, the *alata, bulbifera*, and *sativa.* They grow spontaneously in both Indies, and the roots are eaten as the potato is with us, which they somewhat resemble in taste; but their flavor is more luscious. When boiled, or roasted, they are nutritious, and easy of digestion; and are preferred by many to wheaten bread. They are sometimes ground into flour, and made into bread and puddings. They might doubtless be raised in perfection in many parts of the United States; and we are convinced, that on many accounts, they are a preferable food to the potato.

Cabbage.—The several varieties of cabbage constitute an article of food, than which few are more generally and extensively made use of in this country. For the healthy, robust, and laboring part of the community, cabbage forms an excellent addition to their usual meat diet; and, when eaten in moderation, appears to agree very well with their stomach. But, after all, cabbage affords but little nutriment, is very flatulent, and where the stomach is delicate or irritable, it is very apt to produce uneasy sensations, colic, or even a tolerably severe attack of vomiting and purging. For the invalid, therefore, or persons who lead sedentary and inactive lives, cabbage is a very improper food. The only proper mode of cooking cabbage is by boiling it, until such time as it is perfectly tender. Boiling it in two waters deprives it, in a great degree, of that unpleasant taste and smell, which are so disagreeable to many palates.

Sourcrout, or cabbage prepared in a particular manner, and allowed to undergo fermentation to a certain extent, forms an excellent and wholesome vegetable food for the crews of ships destined for long voyages; and for all persons so situated as to be deprived of a sufficient supply of fresh vegetables. In regard to its effects upon individuals whose powers of digestion are impaired, the same remarks will apply as to cabbage in its recent state.

Brocoli.—Brassica italica.—A species of cabbage which furnishes a very agreeable article of food. Though sweeter, and of a more tender texture than the other varieties of cabbage, it is still apt to disagree with weak stomachs, producing flatulence, and often colicky pains. By the sedentary and dyspeptic, it should therefore be carefully abstained from.

Cauliflower is perhaps the species of cabbage which is the most readily digested by persons in ordinary health. It is liable, however, to the same objections, as an article of food for the sedentary and inactive, as cabbage in general.

Artichoke.—Cinara scolymus.—A kind of thistle, cultivated for the table. The only alimentary part of the plant is the receptacle of the flower. The whole of this receptacle, even in its recent state, possesses very little of the acrimony peculiar to the other portions of the plant; and, when well boiled, it is perfectly mild, of a tender texture, somewhat sweet and mucilaginous, and, therefore, tolerably nourishing. It is sometimes, however, rendered unwholesome by being eaten with a large quantity of melted butter.

The Jerusalem artichoke, *helianthus tuberosus*, is a species of sunflower, having fleshy tuberculated roots somewhat resembling small potatoes. These tubercles are sometimes eaten as food; and when roasted or boiled, they acquire a mealy texture, like the potato, but with a sweet taste, resembling yam. As an article of diet, they may be ranked with the potato, though they are very apt to be more watery and flatulent then the latter, when of a good quality.

Spinage.—The *spinacia oleracia*, of botanists. The tender leaves of the spinage well boiled, constitute one of the best and most wholesome of the green vegetables in common use. They act gently upon the bowels, and are particularly useful to persons habitually costive.

Asparagus.—The *asparagus officinalis* of botanists. The asparagus has a creeping root, throwing up numerous scaly erect stems, the tender ends of which, on their first appearance above the ground, are the parts used as food. These shoots are, when sufficiently boiled, readily dissolved in the stomach, and are not disposed to create flatulence and acidity. Asparagus is wholesome only when in its early state; when old, it is remarkably acrid.

Poke.—The tender shoots given off in the spring from the roots of the poke, (the *phytolacca decandria*) cooked in the same manner as the asparagus, is esteemed by many an equally delicious and wholesome vegetable. It is difficult, indeed, to distinguish it, so far as regards its flavor, from the latter.

Beet.—The *beta vulgaris.*—The root of the plant is of a sweet taste, and a beautiful red color. In some parts of Europe a considerable quantity of sugar is extracted from it; and hence it must evidently possess considerable nutriment. When well boiled, it affords an excellent vegetable for the table. When eaten with vinegar, it will not, however, be found to agree with such stomachs as possess but feeble powers of digestion.

Carrot.—The *daucus carota.*—The root of the carrot, like that of the beet, contains a considerable amount of saccharine matter; it contains also a quantity of mucilage. It may be presumed, therefore, to be nutritive in no small degree. When young, and sufficiently boiled, the carrot forms an excellent vegetable for the table. It is liable, however, to cause flatulence in persons of a delicate stomach. When too old, the fibrous matter it then contains diminishes greatly its digestibility.

Parsnip.—The *pastinaca sativa.*—The root of the parsnip, when well boiled, affords a wholesome and very nourishing food, and one not difficult of digestion. Its nutritive properties depend on the large amount of mucilaginous and saccharine matter which it contains. The peculiar flavor of the parsnip renders it, however, offensive to some stomachs.

Turnip.—The *brassica rapa.*—The root of the turnip forms a very agreeable article of diet, to be taken along with animal food. It affords an excellent, mild nourishment, when there is nothing in the state of the stomach and bowels to forbid vegetable diet. Turnips should be well boiled, and have the water well pressed out of them.

Onion.—The root of the *allium cepa;* it is used both as a condiment and as an article of food. Eaten raw, onions, in general, are much too stimulating for the generality of stomachs; they produce, also, a disagreeable fetor of the breath, and perspiration; and when the stomach is weak and irritable, they cause a sense of oppression, and heat, and sometimes griping. They are most wholesome when boiled or roasted. In this state, they contain a large portion of a mucilaginous matter, combined with a decided sweetness, and may be considered a nutritious and wholesome vegetable for persons in health.

Leek.—The *allium porrum* is eaten as a condiment in its raw state; and when boiled, as a vegetable aliment. It is a common ingredient in soups and various sauces. When boiled, it is sufficiently nutritious and wholesome for those in health; but it is apt to prove flatulent upon delicate stomachs.

Garlic.—The *allium sativum.*—In this country, the root of the garlic is used chiefly as a condiment; when taken in moderation with certain kinds of food, it is not unwholesome. It no doubt contains a nutritive principle; but its taste being offensive to most stomachs, causes it to be used by few as an article of food.

Legumen, or Pulse.—Beans and pease, which are included under the general name of legumens, or pulse, afford a species of farinaceous aliment, containing a good deal of nourishment; but they are very difficult of digestion, particularly in their dried state. They are apt to lie heavy on the stomach, and to occasion flatulence. Hence, as a diet, they are only proper for persons having strong powers of digestion. By the sedentary and dyspeptic, they ought on no account to be used. The symptoms of uneasiness which they cause in such are often very violent. The green pods of certain beans, previously to the full development of the seeds within, when well boiled, afford a pleasant vegetable food, by no means difficult of solution in the stomach.

Salads.—Vegetables eaten in their raw state, with the addition of vinegar, spices, and oil, have received the general name of salads. Few of the salads in common use afford much nourishment, and, like all raw vegetables, are, to a certain extent, indigestible; their indigestibility is likewise often increased by the manner in which they are prepared at table; while the large addition of pepper and other spices combined with them, renders them not unfrequently decidedly injurious to the stomach, by over-exciting it. To the very class of persons by whom they are most freely partaken, the luxurious and inactive, they prove always the most prejudicial. The propriety of eating any vegetable, with the exception of some fruits, without cooking, is, as a general rule, at least doubtful. To those, however, who from any cause are restricted to a diet of salted and smoked meat, raw vegetables, rendered more palatable by the addition of a moderate quantity of vinegar and spices, are supposed to be beneficial; but even then, when a sufficient supply of wholesome cooked vegetables can be procured, we apprehend that the latter will be found most conducive to health.

Celery.—Apium graveolens.—The long leaf-stalks of the celery, when blanched by being covered, during their growth, in trenches from the sun, are eaten raw as a salad, with the addition of vinegar and pepper, and sometimes olive-oil. In this manner they are not, however, very digestible; and, like all salads, will disagree with delicate stomachs.

Cresses.—Sisymbrium nasturtium.—A plant growing plentifully in brooks and stagnant waters. The leaves have a pungent taste, and a penetrating smell like that of mustard-seed, and are eaten as a salad in their raw state, with oil and spices. Used in moderation, they form an excellent addition to animal food for persons in health; when the digestive powers of the stomach are weak, they are, however, apt to cause more or less disturbance.

Lettuce.—Lactuca sativa.—The leaves of the common garden, and other species of lettuce, eaten raw, with oil, or vinegar and spices, is one of the most common salads in ordinary use. It can neither be considered nutritive nor digestible, and as it contains a considerable amount of a narcotic principle, we must consider it as the most exceptionable salad for the general class of persons living in our cities. When used, the leaves should be young, perfectly white, and tender.

Cucumber.—The fruit of the *cucumis sativa.*—It is eaten raw, and in its unripe state. Possessing very little or no nutritive properties, and extremely difficult of digestion, few vegetables of which the inhabitants of this country partake so largely, is so pernicious as the cucumber. We would advise the dyspeptic, and those whose powers of digestion are in any degree enfeebled, to avoid it as they would poison.

Radishes.—The root of the *raphanus sativus*, is eaten raw, with salt. It contains only a very small amount of nutritious matter, and being very difficult of digestion, is an improper article to be taken by persons of delicate stomachs; in such, it is apt to occasion considerable uneasiness, flatulence and pain.

Mushroom.—The mushroom is a very indigestible and unwholesome article of food, affording little or no nourishment. It ought never to be eaten by persons of delicate stomachs. The mushroom is frequently poisonous, and occasions, when taken into the stomach, the most violent vomiting and purging, and other unpleasant symptoms.

Fruits.—Fruits are much used as an article of luxury; and from the bad effects they too frequently produce, they would seem to be by no means of a salutary nature. Looseness, vomiting, indigestion, and even inflammation of the bowels, have been known evidently to proceed from their use in certain cases. Yet it is pretty certain that the fault has lain not with the fruit, but with the consumer. When fruit is eaten in large quantity, and in an unripe state, when it is forced into the stomach, already loaded with a plentiful dinner of soup, meat, pudding, and all the items of a luxurious table; it is not at all wonderful that it should produce disorder of the digestive organs. But when fruit is taken in moderation, of a proper quality, and at proper seasons, no bad effects are to be dreaded. Fruits are evidently useful, and they are kindly sent at the very season when the system, heated and excited by the warmth of summer, stands in need of something cooling and laxative to be taken with the food.

The fruits in most common use may be classed under the heads of stone-fruits, the apple kind, berries, (without affecting botanical accuracy in the use of this term,) and farinaceous fruits. The stone-fruits are those which are of most difficult digestion. *Plums* and *cherries* are particularly so. The ripe *peach* is both delicate in its flavor and easily digestible; the *apricot* is also very wholesome; but the *nectarine* is liable to disagree with some stomachs. The fruits of the *apple* kind are somewhat firm in their texture, and therefore rather indigestible, and liable to be detained in the stomach. *Pears* are rather more wholesome, as their texture is softer. The white skin of the *orange* should be carefully rejected, but the inner pulp is grateful to most stomachs, whether in health or sickness. The fruits of the berry kind are the most wholesome of all. The *strawberry* and *raspberry* are particularly good; the *grape* is cooling and laxative, but the husks and seeds are to be rejected; the *gooseberry* is not so digestible, especially if the skin be swallowed. It is only the pulp of these fruits that is digested; the seeds always pass through the body unchanged, unless they be chewed. Other berries are generally baked in pies, but the pastry should be sparingly used. The *melon*, a farinaceous fruit, is almost certain to disagree with weak stomachs; especially when eaten after dinner. Many fruits, otherwise unsafe, are much improved by cooking. Baked apples are an excellent article of food, and may even be of benefit to dyspeptic patients. Dried fruits are generally esteemed very safe, but they are apt to run into fermentation in the stomachs of children and delicate persons, from the quantity of sugar which they contain.

Apples.—Of this fruit there are several varieties. All of them, when perfectly ripe and mellow, may be considered as wholesome. Though not so liable to run into fermentation as some of the other fruits, yet being of a firm texture they are somewhat difficult of digestion, and remain long in the stomach. Hence they should be avoided by such persons as have weak digestive powers. Stewed or baked with sugar, they are rendered more soluble and wholesome, and in this form prove gently laxative. Dried apples stewed, form an excellent sauce for various species of animal food.

Cherries.—There are several varieties of the cherry. Some contain much water and sugar, others a large proportion of acid; others again present a soft, mucilaginous pulp. The last, when fully ripe, are the most wholesome for eating. In weak stomachs, and when taken in immoderate quantities, cherries, especially the two first varieties, are apt to occasion flatulence and colic. This fruit is, in general, more wholesome when cooked with sugar. In eating cherries, care should be taken to reject the stones; when these are incautiously swallowed, they are occasionally retained in the bowels, producing alarming and even fatal symptoms.

Currants, perfectly ripe, are an agreeable fruit, and perfectly wholesome when eaten in moderation; they have less of a laxative effect upon the bowels than strawberries or gooseberries. The skin and seeds are in a great measure indigestible, and as they constitute a large portion of the dried currants that are imported, these are very apt to cause more or less irritation of the stomach and bowels—this indicates the necessity of great caution in their use. The plumpest and sweetest should be preferred.

Cranberry.—The berries of the *oxycoccus*. It is a plant which grows extensively in many parts of the United States, in uncultivated wet or marshy ground. The fruit, or berries, when ripe, are of a bright scarlet color, and an agreeable acid taste. They are employed in great quantities, stewed with sugar, as a sauce to various species of poultry, and for tarts. In this form they possess a rich and delicious flavor, and are sufficiently wholesome when eaten in moderation. For ducks, geese, and other species of poultry abounding in fat, they form a very appropriate sauce.

Dates.—The fruit of the *phœnix dactylifera*, a species of palm. It is in its dried state that the date is met with in this country. This fruit abounds in sugar, and is highly nutritious. Like most saccharine substances, it is very liable to oppress and disorder persons of weak stomachs, and by them should be eaten with caution.

Figs.—The fruit of the *ficus carica.* The dried fig contains a large portion of sugar, considerable mucilage, and a small quantity of oil. When eaten in moderation, they are grateful to the stomach, and more easy of digestion than most of the dried fruits. When eaten alone, however, they are apt to occasion flatulency, and to disagree with feeble stomachs. The fig acts as a gentle laxative, and may be eaten occasionally with great advantage by persons habitually costive.

Gooseberry.—The fruit of the *ribes grossularia.* When perfectly ripe, they are a delicious and wholesome fruit. In eating them, the skin should always be rejected.

Grapes.—The ripe grape, especially of the rich saccharine species, is among the most luscious and wholesome of our summer fruits. It is the pulp only, however, divested of the seeds, that should be eaten. The large portion of sugar and mucilage contained in grapes renders them nutritive, while their slight amount of acidity facilitates their easy digestion.

Raisins, or grapes in a dried state, are equally nourishing and wholesome to healthy persons with the fruit in its recent state. The skins, however, which can scarcely be rejected in eating them, being rendered tougher by drying, cause raisins to be more indigestible than fresh grapes. They are also more apt to disagree with weak stomachs, in consequence of a portion of their acid being lost in the process of drying, while, at the same time, a larger amount of sugar is developed. The more purple and plump the raisins, the more wholesome they are. They should always be eaten with bread, and never in large quantities, otherwise they are apt to prodnce flatulence and griping pains.

Lemon.—The fruit of the *citrus acida* and the *lime*, the fruit of the *citrus limonium*, which do not differ the least in their qualities, are never eaten as food, from their extreme acidity. The juice of both enters as a condiment in various made dishes. The juice also, diffused in boiling water, and sweetened with sugar, constitutes a very pleasant beverage for quenching the thirst, and allaying heat during the summer season. The *lemonade* thus made may be drank occasionally, without injury; but it is not proper as an habitual beverage, as it is very apt to disorder the digestion, and to produce irritation and pain of the bowels. Preserved limes are indigestible, and one of the least wholesome of the ordinary sweetmeats served at table.

Oranges.—The fruit of the *citrus aurantium.* The juice of the orange is gratefully acid, and, taken in summer, is well adapted to allay thirst, and take off that sense of dryness in the mouth and throat experienced by persons who perspire much during exercise. For the same reason, it is often allowed to patients laboring under fever. The pulp, however, in which the juice is contained is indigestible, and should not be eaten; neither should the seeds nor white tough rind. The best mode of using the orange, to prevent injury to the stomach and digestive organs, is to squeeze out the juice, and drink it diluted with water, and with the addition, if necessary, of sugar. The yellow rind of oranges is frequently used to communicate an agreeable flavor to various dishes; in moderation it is not injurious.

Pear.—The fruit of the *pyrus communis.*—There are several species of pear, some of which, from the firmness of their texture and the acerbity of their juices, are improper for eating, unless well cooked with sugar. Others, however, when perfectly ripe, present a soft juicy pulp, of an agreeable flavor, and readily digested by a healthy stomach.

Peach.—The fruit of the *amygdalus persica.*—The peach is unquestionably one of the most wholesome as well as most delicious of the stone-fruits. When perfectly ripe and mellow, it may be eaten in moderation, without inconvenience. The outer skin should, however be rejected. Neither peaches, nor any other kind of fruit, should be eaten after a copious dinner. They will then be very apt to oppress the stomach, and to cause acidity and flatulence.

Pine-apple.—The fruit of the *bromelia ananas.*—A delicious fruit of tropical climates; but however delicious in flavor, the pine-apple, as we obtain it in this country, is very indigestible, and, when eaten freely, decidedly injurious to the stomach and bowels.

Plums should never be eaten, unless perfectly ripe and mellow. The skin and stones should always be rejected. In their ripe state, or cooked, plums are wholesome and readily digested. But when unripe, or sour, they cause disorder of the stomach and bowels, with flatulence and griping.

Prunes.—Plums, when dried, are denominated prunes. Eaten uncooked, they are difficult of digestion, and unwholesome. When stewed, they have a laxative effect, and freely used in this form, are an excellent means for obtaining a free state of the bowels in persons troubled with costiveness.

Raspberry.—The berries of the *rubus idæus* are a very wholesome and grateful fruit. Next to strawberries, they are perhaps one of our very best summer fruits of the berry kind.

Strawberry.—The fruit of the *fragaria vesca.*—In point of flavor, in the ease with which they are digested by most stomachs, and their general wholesomeness, perfectly ripe strawberries rank first upon the list of summer fruits. Eaten in moderation, at a period when the stomach is not actively engaged in the digestion of other food, they are seldom found to produce the least unpleasant effect on persons in the enjoyment of ordinary health.

Tamarinds.—The fruit of the *tamarindus indica*, preserved in sugar Tamarinds contain too large an amount of acid, and act too powerfully upon the bowels, to permit their being eaten as food. They form, however, a very agreeable and effectual laxative; and a drink made by pouring boiling water upon them is well adapted for quenching thirst, especially in patients laboring under fever.

Melons.—The *cantaloupe* and *water-melon* are the only ones eaten in this country. They both contain a saccharine juice, which may be presumed to afford some nutriment, but they are both very indigestible, and the pulp of the water-melon more especially is apt to oppress and irritate delicate stomachs. They should be eaten, therefore, with great caution; and by the dyspeptic, and those subject to affections of the bowels, abstained from entirely.

Nuts.—The kernels of oily nuts contain a farinaceous substance, combined with a large quantity of bland oil. They are all extremely nutritious, but difficult of digestion, and irritating to the stomach, upon which they are apt to turn rancid, causing heartburn, acid eructation, feverish heat of the skin, pain in the head, and restlessness or disturbed sleep. They are suited only to such persons as are in health and possess active digestive powers. They should never be eaten by the dyspeptic, nor by any one when the stomach is already loaded with other food. They should always be perfectly fresh, and taken with a little salt and with bread, and well chewed before they are swallowed. When taken to excess, or in certain conditions of the stomach, they often occasion difficulty of breathing, and sometimes very violent and dangerous complaints of the bowels.

Almonds.—A well known nut, the product of the *amygdalus communis.*—There are two varieties of almonds, the sweet and the bitter. The bitter almonds are now seldom eaten; they contain an active poison, in consequence of which they are liable to produce injurious effects. Sweet almonds possess little nourishment, and are difficult of digestion, unless thoroughly triturated. In consequence of the oil they contain, they are very apt to produce disagreeable symptoms when eaten by persons the digestive powers of whose stomachs are impaired. By ge they often become rancid, and are then highly acrid, and should on no account be eaten.

Chestnuts contain a considerable amount of nutritious matter. They indeed form a considerable part of the food eaten by the peasantry, in many parts of the south of Europe. The raw fruit, however, is not readily dissolved in the stomach; it is also very flatulent, and apt to occasion colicky pains and bowel complaints. When kept for some time, they evolve a greater amount of saccharine matter, becoming sweeter and more digestible. When roasted, the chestnut becomes still more light and nutritive; they are still, however, as well as when boiled, flatulent, and should be avoided by persons of delicate stomachs, and by dyspeptics generally. From the chestnut may be obtained a farinaceous matter, fit to be made into bread; this bread, however, is neither palatable nor wholesome.

Cocoa-nut.—The fruit of a species of palm, *cocos nucifera.* Within the hard woody shell of the cocoa-nut is a thick layer of a solid white substance of a sweet and agreeable taste, which no doubt contains a considerable amount of nutritive matter; it is, however, extremely difficult of digestion, and very apt to disagree with delicate stomachs. The interior of the nut is filled with a fluid resembling milk, which is made use of in the West Indies as an agreeable beverage to quench thirst.

Condiments.—Condiments, or seasonings, are those substances which, though not nutritive themselves, are taken into the stomach along with the food, to promote its digestion, and to correct any injurious properties it may possess. Some such assistance would seem to be necessary to all animals; and the lower animals instinctively seek after bitters, salt, etc., to take with their food. Condiments are of various kinds, as salt, acids, aromatics, oils. Some of those in most frequent use are sea-salt, vinegar, lemon-juice, pepper, cinnamon, nutmegs, cloves, ginger, allspice, garlic, onions, leeks, horse-radish, and mustard. A small proportion of these condiments may be used with propriety. While they give an additional relish to the food, there can be little doubt that they aid its digestion. But the misfortune is, that in the use of condiments mankind are prone to excess. They are used as stimulants to induce the stomach to partake of food, when already loaded to repletion, or exhausted by habits of intemperance. Condiments also are injurious to the stomachs of those who indulge in the constant use of animal food. They furnish a temptation to excessive indulgence, and ultimately occasion organic disease of the stomach or liver, and permanent injury of the digestive functions. Oils and butter are also to be regarded as condiments; their use ought to be sparing.

All kinds of seasoning, with the exception of salt, are improper for children and young persons generally.

Acids.—Vinegar, and a number of acid fruits and vegetables, or their juices, are often used as condiments to our food, and from experience we should judge, that, during a healthy state of the stomach, and when used in moderation, they are, generally speaking, a very useful addition to an animal diet; especially such as is rich in fat or gelatine. They appear to render it less liable to disturb the stomach, and to cause it to be more readily digested. The addition of lemon-juice to rich and glutinous soup, and the custom of eating apple-sauce with pork, or cranberry-sauce with ducks and geese, may be viewed, therefore, in a favorable light.

Vinegar.—A vegetable acid, the product of the acetous fermentation. For commerce it is procured either by allowing the fermentation of wines, or of cider, to progress until the liquor becomes completely acid. Vinegar is a grateful acid, much used as a condiment with food. In small quantities, it is a grateful and wholesome stimulant; it also checks the fermentation of certain species of aliment in the stomach, and prevents raw vegetables from inducing flatulence; it seems, also, to render fatty and gelatinous substances more easy of digestion, and less liable to offend the stomach. Taken in too large quantities, it, however, produces serious injury to the stomach. Various fruits preserved in vinegar are served at table as condiments, under the name of *pickles.* Prepared in general from firm, unripe fruits, they are extremely indigestible, and when taken in any quantity, disturb the stomach, interfere with the digestion of the food, and often cause griping or colicky pains, and other disagreeable or even dangerous effects.

Anchovy.—A small fish of the herring kind, imported from the coast of the Mediterranean sea, in a pickled state. Anchovies are either eaten as a condiment, or are formed into sauce for other fish. They possess little nutriment, and in consequence of the spices with which they are generally prepared, not only act as provocatives of the appetite, causing too much food to be eaten, but of themselves act injuriously upon the stomach. They should be ranked among those luxuries of the table from which it is better to abstain.

Ginger is the root of the *amomum zingiber.* Its properties are those of a stimulating aromatic, and in moderation it forms a useful and very wholesome condiment. A weak infusion of ginger in boiling water forms an excellent drink for persons the tone of whose stomachs and bowels has been weakened by excess in eating or drinking. Persons who have adopted the commendable resolution of abandoning at once the habitual use of intoxicating drinks, in which they had for many years indulged, will find in the ginger tea a useful beverage, the use of which will remove that sense of sinking at the stomach, caused by the sudden suspension of its accustomed stimulus.

Horse-radish.—The root of the *cochlearia armoracea.* It has a strong, pungent smell; and a penetrating acrid taste. Grated or scraped, with the addition of vinegar, the horse-radish is much used at table as a condiment for various kinds of animal food. In moderation it is wholesome; but with many persons it will be found in any quantity to produce irritation of the stomach and colic.

Mustard.—The flour made by grinding the seeds of the *sinapis nigra;* it is used as a condiment. In moderation, generally speaking, it is not unwholesome; but with many persons the smallest quantity of mustard causes great irritation and heat of the stomach and griping.

Nutmeg.—The fruit of the *myristica moschata,* a native of the Molucca Islands. It is chiefly used to communicate an agreeable flavor to various articles of food; when in moderation, it constitutes a pleasant and harmless condiment. It is too much the custom, however, to add nutmeg to the gruel and panado used as the diet of lying-in women and convalescent patients; here it is injurious by increasing too much the stimulating properties of the food.

Olives.—Pickled olives are eaten chiefly as a condiment. They are decidedly nauseous to most palates when first eaten, but habit soon renders their taste not only pleasant, but a peculiar relish for them is created. Olives, however, are indigestible and irritating to the stomach. They who have gained from active exercise a keen healthy appetite, need them not; and they whose appetite is weak, or entirely lost, will receive injury from their use.

Pepper.—An aromatic and stimulating production of several plants of warm countries, constituting the most common of the stimulating condiments eaten with our food. When used in very moderate quantities, it is not injurious, in some instances decidedly wholesome; but when resorted to in excess, or as a stimulant to spur on the jaded appetite to new efforts, it is destructive to health.

Cayenne-pepper, capsicum annuum.—The pods of this plant constitute one of the most heating and stimulating of the various condiments employed in cookery. In moderation, it forms a very proper addition to some kinds of food, but when used in excess it produces all the injurious effects which arise from the immoderate use of condiments in general.

Salt appears to be a natural and necessary stimulant to the digestive organs of all warm-blooded animals; hence they are led instinctively to immense distances in pursuit of it. In man, it seems not only necessary, to render his diet sufficiently sapid, but to a certain extent to be absolutely essential to health. When entirely deprived of it, the digestive organs become diseased, and nutrition imperfect. The excessive use of salt is, however, in the highest degree injurious.

Preserves are different kinds of fruits, boiled or stewed in sugar or molasses. When eaten in moderation, with milk or bread, preserves constitute an innocent if not advantageous addition to our meals; provided always, they are prepared of fruit tolerably ripe and not too sour. With the stomach of the dyspeptic, however, preserves will seldom agree. Many of the foreign preserves being prepared of vegetables of a very tough consistence, and containing a large amount of woody fiber, are altogether indigestible, and invariably disturb the stomach and bowels of those who partake of them. Preserves should never be kept in glazed earthen-ware vessels. The oxyd of lead contained in the glazing being acted upon by the vegetable acids, renders the fruit and its syrup to a certain extent poisonous.

MEALS.—The quantity of food taken at regular intervals, is commonly understood by the term *meal.* Regularity in the number of meals, and the periods at which they are taken, is of the first importance; on it much of the equable and pleasant enjoyment of health depends. Some medical writers have considered one, others two, three, and even four meals a day necessary. But it may be laid down as an incontestable rule, that the number of meals should be regulated by the degrees of exhaustion, and diurnal habits of life to which every individual is subjected. In general, three frugal meals, in the course of the day, seem the most desirable, and the best adapted to the wants and constitution of the human frame, while, at the same time, this number is best suited to the powers of the digestive organs. In the adoption of this salutary rule of diet, Fashion, all-powerful as she is, has at length, on most occasions, yielded to Reason.

The periods at which meals should be taken, and the intervals that should elapse between them, deserve attention. The practice which leaves the great bulk of the day without a meal, and then crowds two or three together, is manifestly bad, as it produces in the body a state of exhaustion and fatigue, which strongly tends to enfeeble the powers of digestion. To confirm and preserve health, whatever may be the number of meals taken, they should be eaten at regular times and stated periods; and they should be regulated by the strength or debility of the stomach, and the quantity and quality of the food taken, or to be taken, at the preceding or following meal.

Breakfast.—Breakfast is the first meal taken in the morning. This meal is of considerable importance, as many hours have passed since the stomach was supplied with food; and because the food then taken is that which is to give strength to the system for the most active part of the day. Its time, its materials, and accompaniments, are therefore worthy of being well adjusted; although, from the endless varieties of habits, constitutions, and employments, no fixed rules on any of these particulars can be given. During sleep, the whole of the food taken the night before has probably been digested; and, consequently, in healthy persons it is generally found that the appetite is for the most part peculiarly keen in the morning, in consequence, as well of the emptiness of the stomach, as from its digestive powers having been refreshed by rest, and in this manner prepared to resume with vigor their functions; but, in general, it is proper to interpose some time between rising and taking breakfast; though many feel so much inanition and feebleness, that they are unfit for any of the duties of the day until they have taken some food. In regard to this, every one must decide for himself.

The quality of the food to be eaten at breakfast is to be regulated by the exercise and labor to be taken, and by the time that is to elapse before dinner. The physician would be much inclined to interdict luncheons; and, therefore, to recommend a considerable proportion of solid food at breakfast. Cold mutton or beef, rice or eggs, may be taken at breakfast. Copious breakfasts, however, are apt to be heavy to many stomachs, and to occasion heartburn, especially when a great deal of liquid has been taken along with them; but this does not militate against a proper quantity of diluting drink being taken at breakfast. The expenditure of fluid by insensible perspiration, which has taken place during the night, with the greater acrimony of all the secretions in the morning, point out the propriety of a considerable quantity of diluting fluid at the breakfast meal; and the choice of this fluid must be left, in general, to each person's experience of what agrees best with him. Weak tea agrees well with most people; but with many it occasions heartburn and acidity; perhaps the fault may not be in the tea, but in the quantity of new bread, or of butter, taken along with it. Trials must be made, by omitting one or more of the articles taken, till it be ascertained which of them is in fault. If tea or coffee is found to disagree, milk or gruel may be substituted.

Luncheon.—By luncheon is generally meant that food taken during the morning between breakfast and dinner. Generally speaking, when the former meal has been sufficiently hearty, and composed partly of solid aliment, the *luncheon* will be unnecessary; and the habit of partaking of it should, as much as possible, be avoided. But to a healthy person, whose digestion is good, who is accustomed to a great deal of active exercise, and who, in the early part of the morning, has taken no very substantial or copious repast, the *luncheon* will probably be a matter of indispensable necessity. It should, however, consist of a very moderate quantity of light and easily digested food. Many of those, however, who take luncheon, find it to spoil the digestion of their dinner; much more will this be experienced by the dyspeptic patient, who needs his stomach to be undisturbed during the digestion of his regular meals, and who should not exhaust its powers by calling them too frequently into action. If additional food be taken before the former portions are assimilated, the process of digestion will be disturbed; and however plausible may be the maxim, that the stomach will be best managed, and the strength improved, by taking small quantities of food very frequently, yet this is not found to be true; in fact, the invalid thrives much better by regular meals, at proper intervals, than by that constant throwing in of a supply as fast as a morbid craving calls for it, or as a false theory says it should be taken.

Dinner.—Dinner, in this country, is the principal meal of the day, and is, in general, taken at the close of the morning, or during the first hours of the afternoon. This period for dining appears to be well chosen for the active classes of society more especially. Several hours having elapsed since the morning meal, the stomach may be expected to have disposed of the food then taken, and to demand a new supply, while a sufficient period will elapse between dinner and the evening repast to allow of uninterrupted and complete digestion. Dinner is, in general, composed of meat and vegetables, variously cooked, or of soups. Attention is seldom paid to the character of the food taken at this meal, or to the proper rules of diet; and hence it is at dinner that the greatest errors are generally committed in regard to the quantity and quality of the food taken. Dinner should always consist of one dish of meat, plainly cooked. Variety of food, like too much seasoning, keeps up the appetite after the wants of the system are satisfied; and hence the stomach is oppressed by too great a quantity of aliment, and digestion is impeded even to a greater extent than were the same amount to be eaten of a single dish. Let it be recollected, also, that dishes compounded of a number of ingredients, the natural qualities of which are completely disguised by the refinements of cookery, are altogether unwholesome: many of them are little better than poisons. It is all-important that sufficient time should be allowed for this meal, in order that the food may be properly chewed, without which its digestion will be greatly retarded. In regard to the necessity of drinking at table, but little need be said. If the food be sufficiently plain and juicy, thirst will seldom be experienced; but when a desire to drink is experienced, a moderate draught of water will be proper. But no other liquor should be taken—water is the only natural diluent of our food, every other liquor impedes its digestion. Hence the custom in use among some people of taking drams before dinner, for the purpose, as they allege, of whetting the appetite, is highly pernicious, and has quite a contrary tendency to that designed, as it relaxes the stomach, and consequently enfeebles it for the operations it has to perform. For the same reason, the practice of taking brandy or liquors with goose, pig, etc., is objectionable. Nor is the fashion of taking wine, or brandy and water, during dinner, less reprehensible. The use of bottled cider, porter, or beverage, during this meal, is also injurious, as it unnecessarily distends the stomach, and thus prevents its muscular contractions at the very time when it is necessary they should be brought into action, and preserved in their full vigor. To say the least of all these vulgar errors in diet, they check the process of digestion, and paralyze the powers of the stomach. Coffee may, however, be safely and advantageously taken after dinner, as it accelerates the operations of the stomach, and assists digestion, provided it does not exceed a small cup or two, and is taken without sugar or milk.

Supper.—Supper is the meal taken late in the evening, or just before going to bed. As the powers of the body, and digestion among the rest, are diminished in their activity during sleep, it is an unsafe measure to load the stomach at bed-time with a large quantity of various kinds of food. When this is done, there is great distention, both from the load thrown in, and from flatulence; hence the person is liable to be disturbed with restlessness, or nightmare, and frightful dreams. If tea has been taken in the early part of the evening, no food will be required until the next morning. When a sensation of hunger is felt, however, before bed-time, a slight and moderate repast only is allowable, such as an egg, or some preparation of milk, or oat-meal gruel, which last, however, is apt to become sour on some stomachs. For dyspeptics, suppers and late hours are peculiarly unsuitable. Under no circumstance should food be taken for two or three hours before retiring to rest.

Drinks.—We are warned by the appetite of thirst to take in a certain quantity of liquid to dilute our solid food, and to supply the waste of the fluids of the body, which are continually expended during the continuance of life. So urgent is this necessity, that we are able to bear hunger more quietly than thirst, and to live longer when deprived of food, than when deprived of drink. The quantity of drink required, will vary according to the season and climate, the mode of life, the nature of the food, and the peculiarity of each individual. When the body is exposed to a high degree of atmospherical temperature, a much greater quantity of drink is demanded, than when the atmosphere is temperate or cold. This arises from the stimulating effects of heat upon the system; but chiefly by the waste of the fluid portion of the blood, occasioned by the increased perspiration. For the same reasons, active exercise or labor augments the thirst. Salted, high-seasoned, and all stimulating food increase the demand for drink, by stimulating the lining membrane of the mouth, throat and digestive organs, and increasing the viscidity and exciting properties of the blood. The same effects are produced by wine and ardent spirits. Dry food necessarily requires more dilution than that which is moist and juicy; and hence, the greater necessity of drinking, during meals principally composed of the former. In regard to the fluid best adapted for an ordinary drink, there can be no hesitation in stating, that it is water, and water alone —no other can answer so well as a diluent for our food, and for the preservation of that degree of fluidity in the blood, by which it is best adapted for the nourishment and support of the system. No fluid whatever can be used as a drink, excepting in consequence of the water it contains; and in proportion to its freedom from foreign admixture, or any active ingredient, will it best answer the purpose of a diluent in the animal body. When the taste of man has not been vitiated by the customs of an artificial life, his thirst can be satisfied only by pure water; and even under ordinary circumstances, when the sensation of thirst is intense, every other fluid is loathed. While pure water constitutes the best drink for habitual use—the addition to it occasionally of farinaceous substances, or of some of the vegetable acids, or rendering it slightly aromatic, by infusing into it the leaves of certain herbs, is not injurious, and, under certain circumstances, may be advisable.

The effects of simple fluids on the body vary considerably, according to their temperature, their volume, and the time when they are drank. Persons in good health, generally take a great portion of their drinks, especially at dinner, of the temperature of the atmosphere; but in weaker stomachs, the drinks may be required to be a little warmed, though it is seldom safe to take them habitually very hot; and far less is it proper to chill the energies of the stomach, by cold or iced drinks. The quantity of drink taken, is also of much consequence to good digestion; a large volume of fluid will prevent the food from being properly acted upon by the stomach; and if there be too little, the mass will be dry and hard. Different kinds of food require different quantities of liquid; animal food requires more than vegetable; roasted, more than boiled; and baked meat, more still than roasted. The time of drinking may be generally left to the individual. To load the stomach with drink before a meal, is unwise; but to drink more or less, during a meal, according to the nature of the food, assists digestion.

Toast-water, is water impregnated with the soluble part of toasted bread, it is perfectly wholesome, and agrees frequently with persons whose stomachs do not relish pure water. Hard biscuit, reduced by fire to a coffee-color, has been recommended as the best for making toast-water. It should be drank as soon as it has cooled, as it acquires an unpleasant flavor by keeping. Toast-water has a slightly nutritive quality, and may be allowed in all the feverish and other cases, where diluents are proper.

Capillaire.—A syrup made from a docoction of the leaves of the maiden-hair, *adiantum pedatum*, with the addition of sugar; when mixed with water, it forms an excellent and very pleasing drink to allay thirst in warm weather.

Artificial Mineral Waters.—The artificial mineral waters of the shops, with or without syrup, form a grateful and very wholesome drink in warm weather. They consist merely of water, surcharged with carbonic acid gas. Mineral waters should not be drank immediately before a meal, as the gas they contain, by unduly distending the stomach, may prevent the proper digestion of the food about to be taken, neither should they be drank immediately after eating.

Whey.—When milk is curdled by the addition of rennet, or spontaneously, it separates into two parts, the *curd*, or solid white portion, and the *whey*, or the thin watery portion, of a yellowish green color, a pleasant sweetish taste, and retaining the flavor of the milk. Whey affords a bland, easily assimilated nourishment, increasing the secretions, and tending to produce a beneficial change in the fluids of the body. It contains a considerable amount of sugar, which renders it sufficiently nutritious. As a drink, whey, in point of salubrity, is inferior only to water; and it is, therefore, admirably adapted to allay the thirst of laborers in hot weather.

Buttermilk.—The fluid which remains in the churn after the butter is extracted from the milk contains but little nutritious matter; but, in warm weather, it forms an excellent cooling drink, and, with bread, may constitute a considerable part of the diet of children.

Tea.—*Thea.*—A plant of various species, which grows in China and Japan, of which great quantities of the dried leaves are imported annually from China. In many parts of Europe, and in America, the infusion of these leaves has become one of the necessaries of life; and from its fragrant and agreeable properties, it is likely forever to remain in universal estimation. The principal kinds of tea used in this country, are the green and bohea; of which there are three kinds of the first, and five of the second. The green tea is the most remarkable for its sleep-repelling properties. The bohea is that in most general use.

The properties of tea seem to be those of an astringent and narcotic; but like some other narcotics, in small quantity, its first effect is that of a very gentle stimulant, and certain kinds of it, when taken pretty strong, and near the usual time of going to rest, have the effect of keeping off sleep; but when weak, and taken moderately, and tempered with cream and sugar, it acts merely as a grateful diluent, and produces a slight exhilaration.

On its first introduction, and for more than fifty years afterward, tea was violently assailed, and many frightful disorders were attributed to its use; it was said to produce indigestion, lassitude, melancholy, and a long train of nervous complaints. When drank very strong, or in excess, by the sedentary and inactive, there can be no doubt of its injurious effects upon the stomach, and through it upon the system generally. The green and high-flavored teas are those which are the least wholesome. Tea should not be taken too soon after dinner, as it may interfere with digestion from its distending the stomach, and from its astringent and narcotic properties; but when taken three or four hours after the principal meal, it assists the latter stages of digestion, and promotes the insensible perspiration; more, however, from the warmth of the water in which it is infused, than from any beneficial effects of the tea itself. A strong infusion of green tea especially, under such circumstances, would rather impede than promote digestion. There are some peculiarities of constitution which render the use of tea very hurtful; but the same is true of many substances, used both in diet and medicine.

They who are fixed down to a sedentary employment, who must work at night, and who take tea to keep themselves awake—who, from the want of exercise, are unable properly to digest animal food, will, no doubt, exhibit many symptoms of indigestion, and that feeble tremulousness, known by the epithet *nervous*, from its use; but the tea ought not to bear all the blame of producing those disorders, which are more justly to be ascribed to the confinement and inactivity of the patient. Nevertheless, that under such circumstances, the use of tea is absolutely injurious, and aids in the destruction of health, there can be little doubt. We do not object to a cup or two of tea of a moderate strength, as an evening repast for the mechanic; but we must be allowed to say, that for breakfast his health will be better supported by something more substantial and nourishing than the ordinary meal of bread and tea, or bread and coffee.

The following rules, respecting the use of tea, will be found useful: 1. Carefully avoid the high-priced and high-flavored teas, more especially if *green*, which generally owe their flavor to pernicious ingredients, and abound most with those active principles from whence the noxious effects of the article arise. 2. Take with it, at all times, a good proportion of milk, and some sugar, as correctives to any possible noxious qualities present. 3. Let the quantity of tea used at each infusion be very moderate. 4. Make the infusion properly, with water, soft, and otherwise of a good quality, and in a boiling state. 5. Take less tea in the morning than in the evening.

Coffee.—The seeds of the *coffea arabica.*—The seeds, when torrefied, ground, and infused in boiling water, afford the well known beverage, the use of which, at breakfast, has become almost universal among the more opulent classes of society throughout the United States, and in our principal cities, among almost every class. The infusion of coffee acts as a stimulant upon the stomach, the heart, and the nervous system, increasing the circulation of the blood, augmenting the heat of the skin, and exhilarating the mind; these, its immediate effects, are followed, however, by an equal degree of depression in the functions of those several organs: the excitement and subsequent depression being in proportion always to the strength of the infusion, and the quantity drank. Hence, coffee bears a strong analogy, in its effects upon the system, to wine, ardent spirits, and opium; from the latter, its effects, however, are very different in degree. Coffee, therefore, when drunk very strong, or indulged in to excess, is unquestionably injurious; it seldom fails to disorder the stomach, impair its digestive powers, and in delicate habits it often occasions watchfulness, tremors, headache, and many of those complaints vaguely denominated nervous. To the dyspeptic and sedentary especially it forms a very improper article of diet. When taken weak, and with plenty of cream or milk, and sugar, it may, however, be indulged in to the extent of a few cups a day, by persons in health, and who lead active lives, without much inconvenience; and when drunk soon after dinner, in the quantity of about a cupful of the plain infusion, it is said to assist digestion. Coffee should never be taken late in the evening, in consequence of its tendency to prevent sleep.

Chocolate.—The nut of the *theobroma cocao*, divested of its envelop, and well triturated, forms, when boiled in water, or in milk, a rich nutritious diet, well adapted for robust and laboring persons. With the stomach of the feeble and sedentary, it is apt, however, to disagree, unless made very weak. For such, however, the shells of the cocao-nut, boiled in water, with the addition of sugar and milk, will afford a very pleasant and excellent article of diet. During the winter season, chocolate, of a good quality, would form undoubtedly, for the generality of persons, a far preferable breakfast to either coffee or tea, both in respect to the nourishment which it communicates to the system, and the stimulus or temporary strength afforded by it; thereby enabling the individual to perform with ease a greater amount of labor. The common kinds of chocolate sold in the stores are too often sophisticated by the addition of flour and suet, and should, therefore, be avoided as unwholesome.

Spruce-Beer.—A drink made by fermenting molasses, diluted with water, with the addition of yeast or porter, and the essence of spruce. Before the fermentation is completed, it is bottled. Spruce-beer can scarcely be considered as intoxicating; the fermentation being never allowed to go on so far as to produce any great amount of alcohol. It is not, however, a suitable drink for persons with weak digestive powers. The carbonic acid gas with which it is so copiously impregnated, and which gives to it its foaming and brisk appearance, unduly distends the stomach, and impedes digestion; while the saccharine matter of the beer becomes quickly acid, producing pain and irritation.

Cider.—The fermented juice of apples. As an habitual drink, cider is not to be recommended. When new, or imperfectly fermented, it is apt to turn acid upon the stomach, and to occasion flatulency and colic When rendered more stimulating by a more complete fermentation, boiling, and age, it produces the same injurious effects as the weaker wines, while it intoxicates much more rapidly. The weakest kinds of cider contain 5.21 per cent. of alcohol, and the stronger nearly 10 Whether it be from the acids contained in cider, or from some unknown cause, we cannot say; but it is certain that few drinks used habitually are so apt to disorder the stomach and bowels. Cider is sometimes rendered pernicious by impregnations of lead, and most generally by a considerable amount of ardent spirits being added to it, to increase its strength, and prevent it from spoiling by age.

Malt Liquors.—Malt liquors, under which title we include all kinds of beer, porter, and ale, produce, when taken in excess, the worst species of drunkenness; as, in addition to the intoxicating principle, some noxious ingredients are too generally added to them, for the purpose of preserving them and to give to them their bitter flavor. The hop of these fluids is highly narcotic, and brewers often add other substances, to heighten its effect, such as hyoscyamus, opium, belladonna, cocculus Indicus, laurocerasus, etc. Malt liquors, therefore, in whatever quantity they are used, act in two ways upon the body, partly by the alcohol they contain, and partly by the narcotic principle. In addition to this, the fermentation which they undergo is much less perfect than that of spirits or wine. After being swallowed, this process is continued in the stomach, by which fixed air is copiously liberated, and the digestion of delicate stomachs materially impaired. Cider, spruce, ginger, and table beers also, in consequence of their imperfect fermentation, often produce the same bad effects, long after their first briskness has vanished.

Persons addicted to the use of malt liquors increase enormously in bulk. They become loaded with fat; their chin gets double or triple, the eye prominent, and the whole face bloated and stupid. Their circulation is clogged, while the pulse feels like a cord, and is full and laboring, but not quick. During sleep, the breathing is stertorous. Every thing indicates an excess of blood; and when a pound or two is taken away, immense relief is obtained. The blood, in such cases, is more dark and sizy than in other persons. In seven cases out of ten, they who indulge to excess in the use of malt liquors, die of apoplexy or palsy. If they escape this hazard, swelled liver, or dropsy, carries them off. The abdomen seldom loses its prominency, but the lower extremities get ultimately emaciated. Profuse bleedings frequently ensue from the nose, and save life, by emptying the blood-vessels of the brain.

The effects of malt liquors on the body, if not so immediately rapid as those of ardent spirits, are more stupefying, more lasting, and less easily removed. The latter are particularly prone to produce levity and mirth, but the first have a stunning influence upon the brain, and in a short time render dull and sluggish the gayest disposition. They also produce sickness and vomiting more readily than either spirits or wine.

Both wine and malt liquors have a greater tendency to swell the body than ardent spirits. They form blood with greater rapidity, and are altogether more nourishing. The most dreadful effects, upon the whole, are brought on by spirits, but intemperance in the use of malt liquors is the most speedily fatal. The former break down the body by degrees; the latter destroy life by causing some instantaneous apoplexy, or rapid inflammation.

Wine.—Wine is the produce of the fermentation of the juice of the grape, but the term is frequently applied to the product of the fermentation of any subacid fruit. The grape is remarkable for containing within itself all the substances necessary for the production of wine; but the juices of other fruits must have the addition of sugar and other ingredients, and in the proportions and management of these additions consists the art of making home wines. Another circumstance in which the juice of the grape differs from other vegetable juices, is its containing a large proportion of tartar; while the others have more of the malic acid, or that acid which abounds in apples; and hence, many of the wines of this country partake of the properties of cider, and are apt to become sour. The characteristic ingredient of all wines is alcohol, or spirit of wine; on this depend their stimulating properties, and the quantity and state of combination in which it exists in wines, are the most interesting points for the consideration of the physician. Under the article alcohol we shall mention its highly stimulating and intoxicating properties; and when we know, by the experiments of modern chemistry, that many wines in common use contain from a fourth to a fifth of their bulk of alcohol, we can easily understand the stimulating and intoxicating effects produced by such wines.

But, besides the alcohol naturally contained in wines, the stronger wines of Spain and Portugal are rendered marketable in this country by the addition of brandy; and it is to this additional spirit, in a free state, as chemists call it, as well as to the combined alcohol, that the injurious effects of these wines are to be ascribed.

There is a distinction of wines, arising from their color, into white and red. This color is derived not from the juice, but from the husk of the grapes. It is, in general, highly astringent, and abounds most in the red wines. Notwithstanding the quantity of astringent matter in the red wines is very small, yet delicate stomachs are much affected by it.

The flavor peculiar to different wines depends on some very delicate principle, which chemists have not been able to detect; in some wines it produces a remarkable effect on the nervous system, as in Burgundy; the excitement produced by this wine being very peculiar, and not at all in proportion to the alcohol contained in it. Some wines have an artificial flavor imparted to them by the introduction of foreign ingredients, as almonds and turpentine. Wines also contain a small portion of acid, but so very small, in general, as to be in all likelihood incapable of causing any bad effects to those who drink them. Acidity of stomach may unquestionably follow the drinking of wine, but from other causes than the mere portion of uncombined acid which they contain. This same acid has also been blamed, with equal injustice, for giving rise to attacks of gout. Claret has been particularly suspected of this bad tendency; but when a person is predisposed to gout, excess of any kind, either in diet, exercise, or wine, will produce the paroxysm.

The general effect of wine on the healthy body, when taken in mod eration, is to excite for a time the powers of life, to assist digestion, to quicken the circulation, to exhilarate the spirits, and to increase the mental energies. But at the same time, it must be recollected that these exhilarating effects are of the most insidious nature, and in place of remaining permanently, or allowing the actions of the several organs to sink, when the stimulus is withdrawn, to their healthy standard, they are succeeded by a depression of the vital energies, in direct proportion to the extent of the preceding excitement. When the use of wine, therefore, is habitually indulged in, or when carried beyond moderation, it perverts the faculties, degrades the rational powers, creates a morbid craving for the repetition of the indulgence, and lays the foundation for a long train of sufferings and diseases.

The wine-bibber has usually an ominous rotundity of face, and not unfreqnently of corporation. His nose is well studded over with carbuncles of the claret complexion; and the red of his cheeks resembles very closely the hue of that wine. The drunkard from ardent spirits is apt to be a poor, miserable, emaciated figure, broken in mind and in fortune; but the votary of the juice of the grape may usually boast the "paunch well-lined with capon," and calls to recollection the bluff figure of Sir John Falstaff over his potations of sack.

Burgundy.—A wine classed among those which are called dry and light. It is possessed of stimulating properties greater than can be explained from the proportion of alcohol which it contains, that being only about eleven and a half per cent. Burgundy is, therefore, thought to hold dissolved some unknown principle of great activity. A few glasses of this wine will induce headache and heat of the system, with flushed face, and hardness of the pulse. In many constitutions this excitement may be very unsafe, especially in sanguine constitutions, and where there is any degree of overfullness of the system.

Claret.—A wine brought from Bordeaux, of a delicate flavor, and distinguished by a perceptible combination of the acid with the resinous flavor. It is less heating, and more aperient than other wines. When taken in excess, claret produces acidity and indigestion, often rather from the quantity taken, and the state of the stomach, than from the quality of the liquor. But the clarets of wine-merchants are often very substantial wines, compounded in various ways for the domestic market. They are thus often mixed with hermitage, and with raspberry brandy; and if procured through doubtful channels, as we find them in the hands of the ordinary dealers in wine, they are too frequently acescent, and apparently composed of some claret, mixed with faded port, or some other spoiled wines, or of cider with some coloring and astringent materials; and they are often compounded of still more pernicious ingredients. Claret contains from 13 to 17.11 per cent. of alcohol.

Champagne.—A species of wine containing a large amount of carbonic acid gas, which gives to it its sparkling and effervescing appearance. It contains between 11 and 13 per cent. of alcohol. Champagne wine produces speedy intoxication.

Lisbon wine contains nearly nineteen per cent. of alcohol, hence its unfitness for a common drink.

Madeira wine is still stronger than Lisbon, containing nearly twenty-four and a half per cent. of alcohol.

Port.—A wine made in Portugal, from grapes cultivated in the vineyards along the shore of the Douro. It has received its name from being exported principally from Oporto. Port wine possesses considerable astringency, and a strong odor and flavor of brandy; a quantity of the latter being invariably added to the wine, previous to its exportation. Port wine is very stimulating, and intoxicates quickly. It contains nearly twenty-six per cent. of alcohol. Its effects on health are similar to those of the strong wines generally. The port wine in common use in this country, is an artificial compound of other wines, brandy, logwood and alum, and is extremely pernicious in its effects upon the stomach. The fact is, that the amount of wine annually exported from Oporto, is barely sufficient for the supply of England and her dependencies; but few casks of it, in its original state at least, ever find their way to this country.

Sherry.—A Spanish wine, of that kind which has been termed dry, manufactured at a place called Xeres, in Andalusia; hence the name of the wine, adopting in our orthography *Sh* for the Spanish *X*. This wine has sometimes a peculiar nutty flavor, which is caused by infusing in it bitter almonds. Sherry contains 19.81 per cent. of alcohol.

Alcohol.—Alcohol, in strictness, signifies the pure spirit obtained by distillation and subsequent rectifying, from liquids that have undergone the vinous fermentation. But the term is commonly applied to the spirit, even when imperfectly freed from water, and other foreign matter. Alcohol is obtained in the greatest quantity from the wines of warm countries, some of which yield a third of brandy. The stimulating and intoxicating properties of wines, and all fermented liquors, depend on the alcohol they contain. A very curious and interesting table has been constructed by Mr. Brande and other chemists of Europe, showing the quantity of pure alcohol contained in a variety of wines and other intoxicating liquors, and by which it is shown, that when an individual drinks a bottle of port, or strong Madeira, he introduces into his stomach about one pint of ardent spirit, of the ordinary strength of the purest brandy, or gin; and even if he drink a pint of currant wine, he will swallow half a pint of ardent spirit, of the strength of that generally met with in the stores.

Alcohol differs slightly in some of its properties, according to the substance from which it is procured. When obtained from an infusion of malt, without rectification, it constitutes *whisky;* when from sugar, *rum;* when from an infusion of rice, *arrack;* and when it is distilled from wine, it constitutes the *brandy* of commerce. *Gin* is alcohol flavored with the essential oil of juniper. Other intoxicating drinks are obtained by distillation from peaches, apples, Indian corn, potatoes, the fermented milk of animals, etc.; as ordinarily drunk, ardent spirits contain, besides other foreign ingredients, fifty per cent. of water.

Ardent Spirits.—Ardent spirits is a general name for the spirituous product of distillation, from various vegetable substances. The principal of these are brandy, rum, gin and whiskey, obtained respectively from wine, the juice of peaches and apples, sugar, barley, rye, Indian corn, juniper berries, etc.

Ardent spirits, of every description, are in their nature and ordinary effects, extremely *unfriendly* to the human constitution; and the art of distillation is beyond all doubt, the most fatal discovery, in respect to the health of the community, which the ingenuity of man ever devised.

Ardent spirits should never be taken in any quantity by those who are desirous of preserving good health, enjoying the full vigor of their systems, and prolonging their lives. When taken as a drink, they stimulate the stomach and neighboring viscera, as well as the heart and brain, to an excessive and unnatural action, impair the appetite, impede digestion, and lay the foundation of serious disease in the most important organs. These effects are as certainly produced by the frequent use of spirits diluted with water, as when they are taken pure; hence, weak brandy and water is a very exceptionable beverage for common use, notwithstanding its being frequently recommended by some medical men, under the erroneous impression that it affords a beneficial stimulus to the stomach.

The habitual use of ardent spirits predisposes the system to the attack of every form of acute disease; and excites diseases in persons predisposed to them from other causes. This has been remarked in all the yellow fevers, and other epidemics, which have visited the cities of the United States. Hard drinkers seldom escape, and rarely recover from them.

The following diseases are the usual consequences of the habitual use of ardent spirits, viz: slow inflammation of the stomach, indicated by a decay of appetite, nausea and sickness, a puking of bile, or a discharge in the morning, of a frothy and viscid phlegm by hawking, fetid breath, frequent and disgusting belchings; enlargement and disorganization of the liver; jaundice, and dropsy of the belly and limbs, and, finally, of every cavity of the body; chronic inflammation of the windpipe and lungs, marked by hoarseness and a husky cough, which often terminates in consumption, and sometimes in more acute and fatal diseases of the lungs; diabetes, that is, a frequent and copious discharge of pale, or sweetish urine; redness and eruptions on different parts of the body; they generally begin on the nose, and, after gradually extending all over the face, sometimes descend to the limbs, in the form of leprosy. In persons who have occasionally survived these effects of ardent spirits on the skin, the face after a while becomes bloated, and its redness is succeeded by a death-like paleness. Epilepsy; gout, in all its various forms; colic; palsy, and apoplexy; and lastly, delirium or madness, are also frequently induced by the habitual use of ardent spirits.

Most of the diseases which have been enumerated, are of a mortal nature. They are more certainly induced, and terminate more speedily in death, when spirits are taken in such quantities, and at such times, as to produce frequent intoxication; but it may serve to remove an error, with which some intemperate people console themselves, to remark, that ardent spirits often bring on fatal diseases without ever producing drunkenness. Many persons are every year destroyed by ardent spirits, who were never completely intoxicated during the whole course of their lives. The solitary instances of longevity, which are now and then met with in hard drinkers, no more disprove the deadly effects of ardent spirits, than the solitary instances of recoveries from apparent death by drowning prove that there is no danger to life when a human body lies an hour or two under water.

Not less destructive are the effects of ardent spirits upon the human mind. They impair the memory, debilitate the understanding, and pervert the moral faculties. They produce not only falsehood, but fraud, theft, uncleanness and murder. Like the demoniac mentioned in the New Testament, their name is "Legion;" for they convey into the soul a host of vices and of crimes.

Certain occasions and circumstances are supposed to render the use of ardent spirits necessary. The arguments in favor of their use in such cases, are, however, founded in error. In each of them, ardent spirits, instead of affording strength to the body, increase the evils they are intended to avert or to relieve.

They are said to be necessary in very cold weather. This is very far from being true; for the temporary warmth they produce is always succeeded by a greater disposition in the body to be affected by cold; and by weakening the energies of the system, they render it more susceptible to a trifling decrease of temperature. Persons habitually addicted to the use of ardent spirits, even such as are not, strictly speaking, drunkards, are known to be much more liable to suffer from the effects of cold, than they who confine themselves to water alone.

Ardent spirits are said to be necessary in very warm weather. Experience, however, proves that they increase, instead of lessening the effects of heat upon the body, and thereby dispose to diseases of all kinds. Even in the warm climate of the West Indies, Dr. Bell asserts this to be true. "Rum," says that author, "whether used habitually, moderately, or in excessive quantities, in the West Indies, always diminishes the strength of the body, and renders men more susceptible of disease, and unfit for any service in which vigor or activity is required." And the same statement is made by nearly every subsequent writer who has treated of the diseases of warm climates.

Nor do ardent spirits lessen the effects of hard labor upon the body. Look at the horse, with every muscle of his body swelled from morning till night, in the plow, or team; does he make signs for a draught of toddy, or a glass of spirits, to enable him to cleave the ground, or to climb a hill? No. He requires nothing but cool water, and substantial food; and the same is equally true in regard to man. There is no nourishment in ardent spirits; they communicate no support to the system. The fictitious strength they produce in labor, is of a transient nature, and is always followed by an augmented degree of weakness and fatigue.

Ardent spirits are taken by many immediately before a meal, to create an appetite, and improve digestion; but, instead of strengthening the stomach, and promoting the digestion of the food, ardent spirits, whether taken before or during a meal, produce invariably an injurious impression upon the digestive organs, and retard the proper solution and change of the aliment which is eaten.

Brandy.—An ardent spirit obtained by distillation from wine. Brandy contains nearly fifty-nine and a half per cent. of pure alcohol.

Cherry brandy.—A mixture of brandy, or rum, with the juice of cherries—by some, it is called *cherry-bounce*, and when sweetened and spiced, it constitutes *cherry cordial.* Its use, as a drink, is attended with even more pernicious effects than plain brandy, rum, or spirits. It is often made use of by females as a cordial, and besides destroying the health of their digestive organs, too often has lead to habits of confirmed drunkenness.

Rum.—An ardent spirit obtained by distillation from fermented juice of the sugar-cane. Rum contains nearly fifty-four per cent. of pure alcohol.

Gin.—An ardent spirit obtained by distillation from fermented grain, with the addition of juniper-berries. It contains upwards of fifty-one and a half per cent of pure alcohol.

Whisky.—An ardent spirit obtained by distillation from fermented grain, and the juice of apples and other fruits. It contains ordinarily about the same amount of alcohol as gin. Genuine Scotch whisky contains, however, fifty-four and one-third per cent., and Irish whisky nearly fifty-four per cent. of alcohol.

Punch.—Notwithstanding the general belief that punch is an innocent drink, we know of few the use of which is more injurious to the stomach. Independent of its stimulating and intoxicating properties from the ardent spirit which it contains, the acid and sugar produce effects the more pernicious, in proportion to the extent to which the stomach has been weakened by previous excesses. After a night spent in punch drinking, a disordered condition of the digestive organs is more generally experienced, and to a greater extent, than after a debauch with any other intoxicating drink. To the sedentary, and to dyspeptics generally, punch will prove a most dangerous beverage.

Cordials, or *liqueurs* as they are termed by the French, are formed of distilled spirits, with the addition of sugar or syrup, and some vegetable aromatic, as the oil of cloves, cinnamon, roses, anise, and the like, or they are flavored by the addition of bitter almonds, bay leaves, peach kernels, and other articles containing a small quantity of prussic acid. When drank in moderation, they are apt to disorder the stomach, as well by their stimulating effects, as by the rapidity with which they turn sour after being taken; used habitually, or drank to excess, they produce all the mischief which follows the use of ardent spirits. They have very properly been styled by a witty writer, "disguised poisons."

INTEMPERANCE.—"Living fast" is a metaphorical phrase which, more accurately perhaps than is generally imagined, expresses a literal fact. Whatever hurries the action of the corporeal functions, must tend to abridge the period of their probable duration. Extraordinary longevity has seldom been known to occur excepting in persons whose existence has been tranquil, and their vital energies seldom excited, either by physical or moral agents, beyond the healthy medium.

But if intemperance curtailed merely the number of our days, many would have perhaps comparatively little reason to find fault with its effects. The idea of "a short life and a merry one" is plausible enough, if it could be realized. But, unfortunately, what shortens existence is calculated also to make it melancholy and miserable. There is no process by which we can *distil* life, so as to separate from it all foul or heterogeneous matter, and leave nothing behind but drops of refined and perfect enjoyment and happiness.

It is seldom that debauchery breaks at once the thread of life. There occurs, for the most part, a wearisome and painful interval between the first loss of a capacity for enjoying life and the period of its ultimate and entire extinction. This circumstance, it is to be presumed, is overlooked by those persons who, with a prodigality more extravagant than that of Cleopatra, dissolve the pearl of health in the goblet of intemperance.

The slope toward the grave is found, by these victims of indiscretion, to be no easy descent. The scene is darkened long before the curtain falls. Having exhausted all that is fine and delightful in the cup of life, they are obliged to swallow afterward the bitter dregs. Death is the last, but not the worst result of intemperance. Punishment, in some instances, treads almost instantly upon the heels of transgression; at others, it follows with a more tardy, although with an equally certain step, the commission of moral irregularity. During the period of a long protracted career of excess, the malignant power of intemperate enjoyment, slow and insidious in its operation, is gnawing incessantly at the root, and often without spoiling the bloom, or seeming to impair the vigor of the frame, is secretly but surely hastening the period of its inevitable destruction. There is no imprudence with regard to health that does not tell; and they are not unfrequently found to suffer in the event most essentially, who do not appear to suffer immediately from every individual act of indiscretion. The work of decay is, in such instances, constantly going on, although it never loudly indicates its advance by any forcible impression upon the senses.

The distinction, although incalculably important, is not sufficiently recognized betwixt stimulation and nutrition; repairing the expenditure of the fuel by a supply of substantial matter, and urging unreasonably, or to an inordinate degree, the violence of the heat and the brilliancy of the flame. The strongest liquors are the most weakening, and in proportion to the power which the draught itself possesses, is the amount of healthful vigor which it deducts from the person into whose stomach it is habitually received. In a state of ordinary health, and in many cases of disease, a generous diet may be safely and even advantageously recommended. But, in diet, the generous ought to be carefully distinguished from the stimulating, which latter is, unfortunately, most frequently used to denominate *good* living. The indigent wretch, whose scanty food is hardly sufficient to supply the materials of existence, and the no less wretched debauchee, whose luxurious indulgence daily accelerates the period of its destruction, may both be said, with equal propriety, to *live hard.* Hilarity is not health, more especially when it has been roused by artificial means. The fire of intemperance often illuminates at the very time it is consuming its victim, and it is not until after the blaze of the electric coruscation that its depredations are exposed.

Stimuli sometimes produce an artificial genius, as well as vivacity. They lift a man's intellectual faculties, as well as his feelings of enjoyment for a moment, above their ordinary level; and if by the same means they could be kept for any length of time in that state of exaltation, it might constitute something like a specious apology for having recourse to them. But unfortunately the excitement of the system can in no instance be urged above its accustomed and natural pitch, without this being succeeded by a correspondent degree of depression. Like the fabulous stone of Sisyphus, it invariably begins to fall as soon as it has reached the summit, and the rapidity of its descent is almost invariably in proportion to the degree of its previous elevation. Genius, in this manner, forcibly raised, may be compared to those fire-works which, after having made a brilliant figure in the sky for a very short ime, fall to the ground, and expose a miserable fragment, as the only relic of their preceding splendor.

Drunkenness.—The baneful effects produced upon the constitution by the habitual and excessive use of intoxicating drinks, are very full detailed in the articles, *Ardent spirits*, *Malt liquors* and *Wine.* These, one should suppose, would be sufficient to deter all from indulging in the use of such drinks, or, at least, that the destruction of the moral, physical and intellectual faculties of man, and the beastly excesses into which he is led by intoxication, would be a sufficient warning to prevent every rational being from falling into so degrading a condition. That infatuation which induces so many, for a momentary and insufficient gratification, to risk the destruction of character, credit and happiness, and to entail upon themselves and families the extreme of wretchedness and misery, can be viewed as little else than a species of insanity; to control the effects of which is unquestionably a legitimate subject for legislative interference. Habits of intoxication very often creep on almost imperceptibly, and the individual is lost even before he has passed the limits of moderation. The elevation of spirits and excited state of the heart and other organs, produced by the stimulation of alcohol, indulged in to a certain extent, are followed by a corresponding depression and languor, to relieve which a renewal of stimulation is demanded, until the very cravings and appetites of the system are enlisted in favor of excess. To avoid drunkenness, therefore, the only certain means is to abstain entirely from drinks of an intoxicating quality, and to seek the pleasurable stimulation, to induce which they are always, in the first instance, resorted to, in wholesome food, fresh air and exercise, cheerful company, the offices of benevolence, and such other physical and moral species of excitement as are friendly to the health of the system, and to the vigor and serenity of the mind, and are never followed by undue depression, nor by regret. Various means have been proposed to wean an individual from habits of drunkenness, particularly by adding to the liquor, drunk by him, certain nauseating or disgusting drugs; but little good has, however, been in this manner effected—moral means, particularly the influence of society, as soon as this can be enlisted in favor of entire abstinence from the use of all intoxicating drinks, are calculated to produce much more decided, extensive and permanent effects in preventing drunkenness, and reclaiming those already addicted to it.

A fit of intoxication, closely resembles that of incipient apoplexy, or palsy. The drunkard staggers, his tongue loses its power of speech, he stammers, sees double, or objects appear to him to revolve, or move in a circular direction. His feelings and perceptions are blunted, and at length a state of insensibility and fatuity is produced. All these symptoms result from an overfullness of blood in the vessels of the brain. If intoxication is still more complete, there is no perceptible difference between it and genuine apoplexy. We have the same lividity and bloatedness of countenance, the same deep comatose sleep, the same complete insensibility, the same stertor of breathing, the same fixedness of the eyes, and dilatation of the pupils, and the same slowness and fullness of the pulse. A person in this state, should be carried, without delay, into a room of moderate temperature, and placed in bed, with his head raised. Care should be taken to remove all ligatures from about his neck and limbs, and to prevent his neck from becoming twisted, or his breathing suspended, by any covering on the face. Cold water may be applied to his head, and if he is desirous of drinking, the simplest beverages, as tea or toast-and-water, should be allowed him. It is said that a drachm or two of a solution of the acetate of ammonia will almost immediately remove all the phenomena of intoxication.

CLEANLINESS.—Among the means which tend most to the perservation of health, and to the promotion of comfortable feelings, is cleanliness. The neglect of it is in fact the immediate cause of some of the most disgusting and fatal diseases to which the human body is liable. Personal cleanliness consists in the careful removal of every impurity from the surface of the body, whether generated by itself, and attached to the clothing in immediate contact with it, or contracted from the air and other matters with which the body is accidentally or constantly surrounded. Allowing impurities to accumulate upon the surface not only gives rise to disgusting effluvia, by which the air the individual breathes is contaminated, but, besides occasioning various eruptive diseases of the skin, it prevents the due performance of the functions of the latter, and in this manner causes disorder of those internal organs which most readily sympathize with it. None of the bodily sympathies are more intimate than that which exists between the stomach and the skin, or between the latter and the alimentary canal, the lungs, the liver, and the kidneys; whatever, therefore, suspends or impedes the functions of the surface, whether cold or filth, a derangement to a greater or less extent of the internal organs invariably results. The skin is not to be considered merely as the covering of the body to defend it from the influence of external agents, but as one of our most important organs, without the continued health and activity of which there can neither be health, comfort, nor long life. By the action of the numerous blood-vessels of the skin, there is removed from out the system, in the form of an insensible perspiration, an immense amount of excrementitious matter, the retention of which would be productive of uncomfortable feelings or disease. The skin is likewise the seat of the *sense* of feeling; upon it external impressions are first made, and from it conveyed to the brain and other internal parts. We can easily comprehend, therefore, in what manner personal cleanliness, by allowing the functions of the skin to be carried on with perfect regularity and freedom, contributes to our health and comfort. The means of preserving the purity of the skin is, frequent ablutions with water, with the addition occasionally of soap and frictions. The ablution of the body should be frequent and general, and not confined simply to those parts that are exposed. Bathing or washing the entire surface in water of a proper temperature, and at short intervals, would sensibly increase the strength, health, and pleasurable feelings of all, whatever may be their sex, age, or condition in life. Frequent change of clothing is equally necessary to the maintenance of personal cleanliness as frequent ablutions of the surface. When the matter exhaled in the form of perspir ation from the skin is retained in contact with it by the clothing, it undergoes quickly a decomposition, and causes diseases of the skin; and by impeding its functions, as well as by contaminating the air we breathe, causes often fevers, and various diseases of a very malignant character. Domestic cleanliness is of scarcely less importance to the preservation of health than that of the person and clothing. From every apartment of our dwellings, as well as from the yards, cellars, vaults, and outhouses attached to them, should every species of filth, every thing which by its decomposition is liable to contaminate the air, be immediately removed, while all the other means for the preservation of domestic purity should be put in constant requisition. But the consequences that result from want of cleanliness are not confined to individuals or to families. From the same baneful source a whole neighborhood or community may become infected with disease of the most violent and deadly nature.

Hence the necessity of preventing all accumulations of filth and stagnant water in the streets, courts, and alleys of towns; hence the utility of draining marshes and improving and cultivating the surface of a country, and hence the unhealthiness of houses situated near sinks, privies, and docks, or rivers, the flat muddy shores of which a e left bare by the receding tide. If cleanliness be essential to the preservation of health, it is no less so to the comfort and ease of the sick. Unless their debility be very great, and unless it be productive of much pain and suffering to move them, the bed and body linen of the sick should be kept very clean, and frequently changed; their apartment should be cleaned and well aired, and all offensive discharges should be very carefully and speedily removed.

Bathing.—The preservation of the skin constantly free from every species of impurity, and in a condition best adapted to the performance of its important functions, being one of the most certain means for preserving the health and promoting the comfort of the system generally, the means for effecting this important end press themselves forcibly upon the attention of all classes of society. In no manner can strict personal cleanliness be so effectually maintained as by frequent bathing. The indifference exhibited by the inhabitants of this country in respect to bathing, whether considered as a luxury, or as a means of prolonging life and preventing disease, is surprising. The frequent use of the bath was enjoined by the Mosaic laws; baths were erected at the public expense in Egypt: by the Greeks and Romans bathing was held in the greatest estimation, and even among the Celtic tribes it was in general use; in the employment of the warm bath the latter were, in fact, earlier than either the Greeks or Romans. At the present day, the habitual and general use of the bath is confined almost exclusively to the Eastern nations, and to a few of those in the more northern parts of Europe. It is much to be regretted, particularly when we consider the general unanimity of opinion among medical men in regard to its salutary effects, that bathing is not at the present day more generally resorted to, and that the means for bathing should not, ere this, have been universally introduced into all our larger cities. To every person, bathing, in water of a proper temperature, is decidedly beneficial; by preserving the cleanliness of the surface, it promotes the functions of the skin and the proper and equal circulation of the fluids; it invigorates every organ of the body, and causes the whole system to feel refreshed. Cheerfulness, activity, and ease, are its invariable effects when properly resorted to.

Cold Bath.—When the body is immersed in water of a temperature ranging from a few degrees above the freezing point up to seventy degrees of Fahrenheit's scale, it experiences the sensation of cold, which is more or less intense, according as the temperature of the bath sinks toward forty degrees, or approaches seventy degrees, and in proportion to the debility or vigor of the bather's system and other circumstances. The cold bath was no doubt the one first resorted to as a means of refreshment and recreation, especially in warm and temperate climates, and during the summer season, in the more northern. It is the one also which is the most generally adopted by savage nations, whose bathing-place is the nearest river, or, when convenient, the sea. There are few subjects in respect to which more erroneous and dangerous opinions have been entertained, than in regard to the effects produced upon the human system by the frequent use of the cold bath. The latter was at one period very generally considered as a tonic, communicating to the body immersed in it additional health and vigor, and a similar idea is still entertained by many persons. We need not wonder, therefore, that it should be so often resorted to as a means of strengthening the constitution of the feeble and valetudinary, and made to constitute an important item in the physical education of youth. The supposition of the tonic and invigorating effects of the cold bath is, however, altogether unfounded, and the practices which have grown out of it have been productive of very serious mischief. The cold-bath, so far from increasing the strength and energies of the system, on the contrary diminishes both. It is not, therefore, a tonic, but a very powerful sedative; its depressing effects being always in direct ratio with the feebleness or exhaustion of the individual subjected to its influence. The effects upon the surface of the body, and through it upon the internal organs, of water of a reduced temperature, are precisely the same as those produced by cold air (see *Cold*,) with this exception, that as water is a better conductor of caloric than air, the heat of the skin will be carried off by the former much more rapidly than by the latter, and consequently the sedative effects of the cold bath will be more quickly and intensely experienced than those of an equally cold atmosphere. Although immersion in water, between forty and seventy degrees of temperature, will be readily borne by an individual in the full vigor of health, and who is not, at the time, laboring under exhaustion from fatigue, profuse perspiration, intemperance, or exposure to intense solar heat; although such a one will feel, on emerging from the water, if the immersion has not been too long continued, an agreeable glow over the whole body, and a feeling of increased vigor and lightness, yet, to those differently situated, the cold bath is not only mischievous in its effects, but may occasion a very rapid cessation of life. It should, therefore, be avoided by the weak and the valetudinary, and by all who are already chilled or laboring under temporary exhaustion from any cause. For young children especially, the cold bath is decidedly improper. The morning and evening are the most proper periods for the use of the cold bath; nevertheless, the strong and robust, who bathe for pleasure, may choose their own time, provided it be not soon after a hearty dinner, nor while the stomach is actively engaged in the business of digestion.

A cold bath in the evening usually procures tranquil sleep, a circumstance well known to the Romans. But bathing at this time is only fitted for those who are accustomed to eat temperately at an early hour, who are not weakened by the fatigues of the day, and who perspire with difficulty. It would be the height of imprudence for those to use the cold bath in the evening, who are fatigued and exhausted with the exertions of the day, who dine late and banquet sumptuously, and who are prone to perspire when asleep.

There is no opinion more generally diffused, and at the same time more erroneous, than that which forbids the use of the cold bath when the system is heated. Dr. Currie has clearly proved that all the inconveniences attributed to immersion in cold water, after the body has been heated by violent exercise, depend not on the preceding heat, but on the debility and exhaustion of the bather at the time, from fatigue or profuse perspiration. In such cases, the salutary reaction and glow that ought always to succeed the bath cannot be produced, owing to the loss of that vigor and energy upon which they depend. The most favorable moment, indeed, for the use of the cold bath is during the greatest heat produced by moderate exercise, and when the body is yet in possession of its full strength. Immediately after running, wrestling, or other gymnastic exercises, by which the Roman youth were inured to the fatigues of war, they darted from the Campus Martius into the Tiber, and swam across it once or twice. The Russians and Finlanders, on issuing from their sudatories, or vapor-baths, in which the thermometer rises to 167° Fah., roll themselves in the snow at a temperature of 13° to 35° below zero; and so far from this transition rendering the impression of cold more hurtful, the good effects of it, on the contrary, are thereby insured. We cannot, in fact, too strongly urge on bathers the propriety of taking moderate exercise before immersion.

The body should not be undressed until the moment of immersion; or, when undressed, it should be closely enveloped in a flannel gown, which may be laid aside at the time of going into the water, and resumed immediately on coming out. Immersion in the water during the whole time of bathing, is far preferable to the person's coming out and plunging in again at intervals, which last practice is apt to produce a chill, and prevent the glow of the surface from following.

Immediately on coming out of the bath, it is proper for the person to dress himself quickly, and it is of the greatest advantage for him to wrap himself up in a flannel gown destined for the purpose. After this a short walk may be recommended—avoiding, however, that degree of exertion which would produce perspiration or fatigue. If the heat be slow in returning, a bowl of warm tea may be taken, or, if the tomach be empty, it will be well to take some light food. It is a bad custom to go to bed after the bath, unless the sensation of cold amoun to shivering, and be accompanied with great weakness, in which case th person may be put to bed, and a bladder filled with warm water applie to the stomach.

Warm Bath.—Water of a temperature of about 95° of Fahrenheit's thermometer constitutes a warm bath. This bath is the one best adapted for general use, both as a means for insuring personal cleanliness and for promoting the health and functions of the skin. Persons in whom the vital actions of the surface of the body are habitually inert, whose skins are pale and of a diminished temperature, and their hands and feet often cold, as well as such as have been accidentally exposed to cold and wet, will find more decided advantage from a bath even a few degrees warmer, while for those of a more robust constitution, with an active circulation and hot skin, as well as for those who have been excited and heated from exercise, water a few degrees lower in temperature is to be preferred. In many parts of Asia, particularly in those under the Turkish dominion, the warm bath is constantly resorted to, not only as an object of luxury, but as an effectual means of restoring strength and comfortable feelings to the body, when exhausted by labor, or fatigue of any kind. In this country, as well as in England, a very general opinion is entertained, on the other hand, that immersion in warm water, especially when continued for any length of time, invariably weakens and diminishes the force and action of the muscles and of the other organs. This opinion, however, is totally unfounded. So far from relaxing the body, diminishing its strength or exhausting its energies, a bath of from ninety-two to ninety-eight degrees, when used even by persons of a delicate frame, or whose system has been reduced by disease, will be found to impart a feeling of refreshment, to improve the strength, and to render their spirits lighter and more cheerful. Although, on immersion in a warm bath, the sensation experienced is that of warmth, yet when the temperature of the water is below that of the body, it must necessarily rob it of a portion of its caloric, and thus reduce the heat of the skin. The warm bath also diminishes the frequency of the pulse, renders the breathing freer and more slow, removes all impurities from the skin, softens its texture, and facilitates the circulation of the blood through its vessels, while it produces upon the whole nervous system a soothing or tranquilizing effect. The internal organs are beneficially affected by the action of the warm bath upon the skin. The healthful actions of the stomach and bowels in particular, and the regular and perfect nutrition of the whole body, are powerfully promoted by its effects in equalizing the circulation on the surface of the body, and in causing the functions of the cutaneous exhalants to be performed with greater regularity and freedom. In promoting the growth and development of the body during infancy and childhood; in preserving the skin at that age free from disease, and the stomach and bowels in the proper discharge of their functions, the warm bath will be found to be admirably adapted. The uncomfortable sensations of increased heat, thirst, lassitude; the accelerated circulation and excited senses experienced after laborious exercise or a long journey in warm weather, are all allayed or removed by a warm bath; while, under such circumstances, the cold bath would be attended with hazard at least, and often with decided injury. After exposure to cold and wet, also, the warm bath, with frictions to the surace, will remove all unpleasant feelings, and prevent any subsequent uffering to the health. The habitually feeble and infirm, the nervous and excitable—they who are readily heated and as readily cooled—or who, in the enjoyment of a tolerable state of bodily health, have their vital energies, nevertheless, readily depressed by trifling causes of a debilitating character, ought all to use the warm in preference to the cold bath. The aged likewise will experience a great increase of comfort and renewed activity in their various functions by the frequent employment of warm bathing. The time for using the warm bath is when the stomach is free from food—or when the body has been fatigued by exercise or labor. The period during which immersion may continue is from half an hour to an hour.

Hot Bath.—This variety of bath is only adapted to cases of disease; its effects will therefore be considered in that part of our work which treats of remedies.

Sea-bathing.—Nearly all the remarks which were made when speaking of the cold bath, will apply to sea-bathing. The effects of sea-bathing are, however, somewhat modified by the circumstances under which it is made use of, and the effects on the skin of the salts with which the water is impregnated. Bathing in the sea is usually preceded by some degree of exercise, in walking or riding to the beach, and is accompanied with considerable muscular exercise in struggling against the waves or in attempts to swim. The dread which many experience on entering the sea, affects powerfully the nervous system, causing hurried respiration and acceleration of the heart's action. To these may be added, the effects from exposure often to a cool and keen wind from the ocean, which on our Atlantic coast must of course be easterly. The slower evaporation of sea than of fresh water, causes the skin to become encrusted with saline particles, which, in consequence of the friction produced by the clothing, excites a gentle stimulation of the whole surface. Hence, persons possessed of much less energy of frame may in general safely venture upon sea-bathing, than can with propriety use the cold bath. Sea-bathing cannot with propriety be resorted to, however, by the delicate and valetudinary, before the middle of June, nor later than the beginning or middle of September. The air of the sea-coast is too damp and cold to be endured with impunity by them at other seasons. The proper time for using the sea-bath is before meals; never should immersion be attempted when the stomach is actively engaged in the process of digestion. The early hours of the morning may be safely appropriated to sea-bathing, provided the individual rises from his bed and reaches the beach with a warm or hot and dry skin. Sea-bathing is always injurious when the skin is cool, chilled, or perspiring, or when the body is exhausted by fatigue, late hours, or intemperance in eating and drinking.

Soap.—Personal cleanliness cannot be effectually secured without the use of soap. A few remarks will render this evident to every one. In addition to the perspiration which is thrown out by the skin, a portion of which always remains upon the surface, the latter is constantly lubricated by an oily fluid. It is this that occasions, after bathing, the water, with which it does not unite, to collect in minute drops upon the body, and which gives to the skin of those in whom it is furnished in large quantities, an habitually greasy and dirty appearance; while of those in whom it is deficient, the skin has a harsh, dry, and scaly aspect. This oily exudation greases the linen when it is worn for too long a time—catches the dust floating in the air, and causes it to adhere to the skin, and likewise retains in contact with our bodies, a portion of the excrementitious matter, which it is the office of the skin to discharge from the system. The removal of this deposit, which is constantly accumulating, is absolutely necessary, as well for personal comfort as for the preservation of health. Now the oily matter referred to, with the foreign substances accidentally combined with it, is not readily nor completely soluble in simple water; it cannot, therefore, be effectually removed without the occasional use of soap, with which it combines without difficulty.

The frequency with which it is necessary to wash with soap will depend, in a great measure, upon the occupation and exposure of individuals. If these be such as do not subject them to an atmosphere loaded with dust, or to the frequent contact of such substances as have a tendency to soil the skin, washing the face, hands, and arms, once a day, with soap and water, will be sufficient, particularly if the water be warm or tepid, and its application be followed by brisk friction with a somewhat coarse towel. But mechanics, and they who, from any cause, are peculiarly liable to have deposited upon their skin, dust, dirt, or any foreign matters, will find that washing several times a day, especially before each meal, and previously to retiring to bed, in addition to a frequent use of the bath, will be demanded, as well for the preservation of the skin as of their health generally.

The ordinary brown and yellow kinds of soap are altogether unfitted for cleansing the skin, as they invariably irritate it, and when frequently used, most generally cause it to become rough, chapped, or covered with painful and unsightly pimples. These effects arise as well from the strength of these soaps as from the yellow rosin which enters so largely into their composition. Most, if not all, of the colored and variegated soaps, prepared expressly for the toilet, are equally objectionable, in consequence of the action on the skin of the coloring matter, which is most commonly some metallic salt. From the occasional use, however, of pure white soap, particularly that manufactured solely from soda and olive oil, which is entirely without smell, hard, and brittle, the fracture presenting a pearly and granulated or crystalline appearance, not the least injury to the skin need be apprehended; while it will be found to cleanse it more effectually from all impurities than any of the substitutes for soaps which females, in particular, are too much in the habit of resorting to; many of which have a decidedly prejudicial effect. Pure white soap ought, therefore, to be invariably used in ablutions of the face and hands, or of the surface generally.

Cosmetics.—Cosmetics are certain washes, sold under different names, which ladies are induced to use, with the hope of beautifying the skin and adorning the person. No regular practitioner will give any encouragement to the use of these, as they always do harm, and frequently cause the occurrence of very dangerous accidents. The most noted are some of the preparations of mercury, or solutions of sugar of lead or of the nitrate of silver; and from the use of this last in particular, effects the very reverse of beautiful take place. Ladies have gone into the bath with a fine white skin, and have come out brown or black, from the chemical action of the water or its gases on the cosmetic. Gowlard's Lotion, a noted cosmetic, is a solution of corrosive sublimate in an emulsion of bitter almonds; and whoever is desirous of escaping the disagreeable consequences resulting from the action of a poison on the skin, or its introduction into the blood, should cautiously avoid all such dangerous compositions.

The only cosmetic wash from which no injury need be apprehended, and the effects of which, when conjoined with temperance, regular exercise, and serenity of mind, will never disappoint those who may be induced to use it, is that composed of *pure* spring water, of a proper degree of warmth.

Cologne-Water.—This fluid is an aromatic tincture, of great fragrance and pungency, much used at the female toilet. It receives its name from the city where it has been manufactured for more than a century, by the members of a family of the name of Farina. The Farinas, of course, loudly vaunt their Cologne-water, as superior to all the imitations of it made in Paris, London, and elsewhere, though the latter are in general so well prepared as to deceive the most suspicious. The following recipe is given to make a tincture which some persons prefer even to the genuine *eau de Cologne* :—

Take of spirits of wine, half a pound; lavender water, one pound; balsam of Peru, fifteen drops; essence of lemons, six drachms; camphor, fifteen grains; spirit of rosemary, half a drachm; bergamot, half a drachm; digest for seven days, and strain. Excepting for its agreeable flavor, we know of no useful purpose to which this tincture can be applied.

Many females are in the habit of using Cologne-water as a wash for the face, in order to preserve the skin smooth and free from pimples, and to prevent it from chapping. These latter effects will, however, be much more liable to result from the stimulation of the skin, caused by the alcohol in the Cologne-water, than when simple soft water is used. It cannot be too often repeated, that the objections to the frequent application of water to the skin are altogether founded in error. The brilliancy of the complexion, and the beauty and delicacy of the skin, can in no way be so well preserved as when frequent ablutions with warm water are resorted to.

Dentifrices.—Substances used for cleaning the teeth; most commonly those which are in the form of powder are so called. Of these there is a great variety, as almost every dentist has his own favorite tooth-powder. Charcoal is much esteemed by some, as it not only cleans the teeth, but is supposed to improve the breath, and to assist in removing any smell from the mouth. In the East Indies, the betel-nut is burned to procure a very fine powdered charcoal. It has, however, the disadvantage of producing a bluish discoloration of the gum, which is indelible. Charcoal seems to act too severely on the enamel; for we have seen many cases where, after the continued use of it and of hard brushes, the enamel has been cut into grooves, as with a file; and it is well known that, from its triturating power, charcoal is used by blacksmiths in polishing steel, to take out the file marks. Magnesia, prepared chalk, powder of cuttle-fish bones, orris-root, and similar substances, are also used, either singly or combined, as dentifrices.

As a general rule, all hard and gritty powders, and all acid washes, are injurious to the teeth. When, from childhood, a life of temperance and active exercise has been pursued, every species of dentifrice appears to be useless; all the care that the teeth then demand, to preserve them white and to prevent their decay, is carefully removing, with a quill or splinter of wood, any portions of food which may have lodged during meals between them, and then to rinse the mouth fully with tepid water, and to rub the teeth and gums well once a day, in the morning, with a soft brush. Most of the accumulations about the teeth, as well as their discoloration and decay, are produced by a diseased condition f the digestive organs.

SLEEP.—Sound, refreshing sleep is of the utmost consequence to the health of the body and the vigor of the mental and corporeal faculties. Indeed, so great is its value, and so peculiar are its effects, that no substitute can be found for it; and if it does not pay its accustomed visit, every individual, without exception, feels his whole frame sensibly exhausted. His appetite ceases, his strength fails, his spirits become oppressed and dejected, or irritable and capricious, and, if the deprivation is long continued, he is soon reduced to a state of the utmost misery. Bodily and mental disease are the usual effects of too long protracted wakefulness.

By regular and sound sleep the exhausted constitution is refreshed, and the vital energies restored; the process of assimilation, or of nourishment, goes on more perfectly; the vigor of the mental faculties is renewed, and the body attains its proper and regular growth. Sleep also contributes to the prolongation of life, and, in many cases, to the restoration of health and the cure of disease.

During the day, the irritability or excitability natural to the human frame in an ordinary state of health is exhausted by light, heat, sound, and, above all, by bodily exercise and mental exertion; and sleep is the method which nature has provided for the reaccumulation of this excitability, and the consequent restoration of the vital energy which the body had lost in the performance of its daily functions.

Among the marks and symptoms of longevity, that of being naturally a regular and sound sleeper is justly considered to be one of the surest indications. This appears to be owing to the physical effects of sleep; to its retarding all the vital movements, collecting the vital power, and restoring to every organ its appropriate degree of energy. Indeed, if great watchfulness, by accelerating the consumption of the fluids and solids, abridges life, a proper quantity of repose must tend to its prolongation.

The preceding observations, of course, refer only to a proper quantity of sleep, as few things are more pernicious than too great an indulgence in it. This excess brings on a sluggishness and dullness of all the animal functions, and materially tends to weaken the whole body. It blunts and destroys the senses, and renders both the body and mind unfit for action. From the slowness of the circulation which it occasions, there necessarily follows great corpulency, a bloated habit of body, and a tendency to dropsy, apoplexy, and other disorders. It will be proper, therefore, to consider—1. The number of hours necessary to be passed in sleep; 2. The period best calculated for repose; and 3. The means of promoting it when wanted.

Quantity of sleep.—What number of hours are necessary to be passed in sleep is a question that has occasioned much discussion. The opinion generally entertained by the ablest physicians is, that although the quantity of sleep must necessarily vary somewhat according to the age and strength, and occupation of individuals, yet from seven to eight hours in the four-and-twenty constitute, generally speaking, the proper time, and that this period should scarcely ever be exceeded by adults in the enjoyment of health. It is indisputable, that the delicate require more than the vigorous, women more than men, and very young children more than either; but it is worthy of particular remark, that the sick and weakly seldom require more than eight hours, or, at the most, nine hours, and will rarely, if ever, fail to be injured by a longer indulgence. Every one, therefore, should endeavor to ascertain what quantity of sleep he requires; that is, by what quantity he is rendered most comfortable and vigorous throughout the day; this all may readily ascertain by experiment.

Nothing can be more absurd than for any individual, who wishes to enjoy health and to accomplish great things, to deny himself the advantages either of sleep or of exercise. Many studious men fall into a great and pernicious error in abridging their proper time for repose, in order that they may have the longer period for study. This is highly detrimental both to the mind and body; for the mind that has been much exercised throughout the day not only seeks to recruit its strength in sound and refreshing sleep, but cannot regain its utmost energy without it; so that, instead of any advantage being gained by passing the greater part of the night in study or other occupations, it must necessarily be detrimental. It has been justly observed, that most persons will be able to perform very effectually their ordinary tasks, whether mental or corporeal, by strict and uniform application during eight, or at farthest ten hours out of the twenty-four, which will leave abundance of time for sleep and exercise.

It is proper to add, that the opposite extreme of indulging in too much sleep should be carefully avoided. By lying for nine, ten, or eleven hours in a warm bed, the flesh becomes soft and flabby, the strength of the digestive organs impaired, and the nervous system relaxed and enervated.

Time proper for repose.—Nature certainly intended exercise for the day and rest for the night. This is proved by experience. For they who, in opposition to the dictates of nature, keep up during the night, whether in exercise, riot, or in study, the activity of the various organs of the system, and endeavor to seek repose for them by sleeping during the day, disturb the whole economy of their bodies by which their health is ultimately more or less impaired. Another point to be considered is, that by the custom of sitting up late at night, the eyes suffer severely, daylight being much more favorable to those delicate organs, than any artificial light whatever.

Valangin relates a circumstance that satisfactorily proves the advantage of sleeping in the night instead of the day. It is an experiment made by two colonels of horse in the French army, who had much disputed which period of the day was fittest for marching, and for repose. As it was an interesting subject, in a military point of view, to have it ascertained, they obtained leave from the commanding officer to try the experiment. One of them, although it was in the heat of summer, marched in the day, and rested at night, and arrived at the end of a march of six hundred miles, without the loss of either men or horses; but the other, who thought it would be less fatiguing to march in the cool of the evening, and part of the night, than in the heat of the day, at the end of the same march, had lost most of his horses, and some of his men.

In hot climates, more especially in the neighborhood of swampy ground, persons cannot too sedulously avoid being out after sunset, on account of the extremely deleterious qualities of the air at that period; indeed, in many places, to breathe the night air is certain death, and in most it is powerfully influential in the production of dysentery, and some of the worst fevers that prevail in those regions.

The plan of going to bed early, and rising betimes, has been called the golden rule for the preservation of health and the attainment of long life, and it is a maxim sanctioned by various proverbial expressions. It is an undoubted fact, that when old people have been examined regarding the causes of their long life, they have uniformly agreed in one particular, that they went to bed early and rose early.

Indulging in sleep during the daytime, and more especially after dinner, is always productive of more or less injury to health, while it is never found to produce even that temporary feeling of refreshment which results from the same amount of repose taken after night. It should be remarked, that although many persons, who have enjoyed good health, have been in the habit of sleeping a little in the afternoon, yet, upon the whole, the practice is not to be recommended, as a far greater number suffer from the habit more or less inconvenience. When individuals in the possession of a good measure of health and strength find an inclination to sleep after dinner, it is very commonly owing to their having eaten too much. They who take no more food than is required for the growth and nourishment of the body, find themselves even lighter and more cheerful after a substantial meal than before it.

Best means of promoting sleep.—Sleep is so natural to man, that in almost every instance, where the individual is in tolerable health, it must be his own fault if he does not enjoy it to that extent which is so essential for his comfort and happiness.

The principal circumstances to be attended to in order to procure refreshing sleep are the nature and quantity of our food and exercise, the size and ventilation of the bed-chamber, the quality of the bed and of its coverings, and the state of the mind.

It is certain that a full stomach almost invariably occasions restless nights, and it is, therefore, an important rule to make a very light supper, and not to take any food whatever later than an hour, or an hour and a half, before bed-time. Toward evening, the digestive organs seek for repose, in conjunction with every other part of the body; they are then fatigued and enervated by the labors of the day, and, consequently, to give them much to do at that period cannot fail to irritate and disorder them, which irritation, from the stomach being the grand center of sympathies, is quickly propagated, through the medium of the nervous system, to every part of the body, hence it is that they who eat late suppers experience a general restlessness, instead of a disposition to sleep. It is worthy of observation also that the stomach will sometimes be much irritated by a small quantity of indigestible food taken at night, and by this sleep may be prevented as certainly as if the organ were overloaded with food.

A sufficient quantity of exercise or muscular exertion powerfully contributes to sleep, and a principal reason why sedentary persons, and students generally, are so distressed for want of it is from neglecting to take active exercise in the day. With some persons, the most effectual methods of procuring sleep will fail, unless exercise be resorted to in the open air. Pure air has of itself an exhilarating and soothing effect on the mind, conducive to sound repose. It is an excellent plan, when the exercise of the day has been limited, to walk up and down a large room or passage for half an hour, or more, before going to bed, and the use of the dumb-bells for a part of the time will augment its good effects.

The size, free ventilation, and coolness of the bed-chamber, and the nature of our bedding, deserve much attention.

If notwithstanding an adherence to the preceding rules, sleep is still found to be unsound and unrefreshing, a brisk use of the flesh-brush, before going to bed or rising from the bed, and freely ventilating it, will often produce a very favorable change.

Another excellent practice, in case you have gone to bed and cannot sleep, is to rise, shake the bed well, draw the upper clothes down to the feet, and walk about the room, warmly clad, till both you and the bed are aired. Exercise, temperance, early rising, and regular hours of retiring to rest, are, however, the best means for procuring sound repose, and if duly persevered in, will never fail of the desired object. Opiates and sleeping draughts should never be resorted to, to procure rest—once resorted to, their habitual use will become necessary, as sleep will not occur without their aid; while by their prejudicial influence upon the stomach and other organs, their employment will never fail gradually to undermine the health of the system.

The following miscellaneous rules respecting sleep deserve to be recorded in this place: 1. Many real or imaginary invalids lie long in bed in the morning, to make up for a deficiency of sleep in the night time; but this ought not to be permitted, for the body must necessarily be enervated by long continuance in a hot and foul air. A little resolution will enable invalids to surmount this destructive habit. By rising early, and going to bed in due time, their sleep will become sound and refreshing, which otherwise they cannot expect to be the case. 2. It is an indispensable rule, that fat people should avoid soft beds, and should sleep little and rise early, this being the only chance they have of keeping their bulk within due bounds. 3. It often happens that if a person has not slept well, he feels a weariness in the morning: this will be best removed by rising and taking gentle exercise. 4. Such persons as are subject to cold feet, ought to have their legs better covered than the rest of the body when they are in bed. 5. We should never suffer ourselves to doze or fall asleep before we go to bed, as it must greatly diminish the probability of sound repose when we wish for sleep. 6. Reading in bed at night is a most pernicious custom; it strains the eyes, prevents sleep, and injures the health. 7. At large schools, where great numbers of children sleep together, the utmost attention ought to be paid to the nature of the beds, the bedding, the airiness of the apartment, and every thing that can prevent the bad effects of crowding numbers together, and compelling them to breathe a confined and vitiated atmosphere. 8. Remember sleep is sound, sweet, and refreshing, according as the mind is free from uneasiness, and the alimentary organs are easy, quiet, and clear.

Beds.—The materials on which we sleep are of much consequence. both as it regards our health, and the soundness of our repose. The use of feather-beds is almost universal in this country, yet there can be no doubt that they are highly injurious to health, and have a tendency to prevent sleep, especially in the summer. To the invalid, and to young persons who are disposed to distortion of the spine and shoulder, they are particularly hurtful. Such as consider them a necessary luxury in the winter, should invariably exchange them for a mattress in the spring and summer. The injury resulting from feather-beds is occasioned, principally, by their accumulating too much heat about the body, and in this manner causing a profuse and debilitating perspiration, and predisposing the system to the influence of slight changes of temperature. By yielding unequally to the pressure of the body, the latter is thrown into a distorted position, which being resumed regularly almost every night, is liable to cause in the young and weakly a permanent deformity. Hair mattresses are superior to every other kind of bed for this country, and it is highly desirable they should be generally adopted. By those whose means will not permit the purchase of hair mattresses, those of moss or straw, or what are still better, those made from the leaves which surround the ear of Indian corn, properly prepared and thoroughly dried, will be found an excellent substitute. Feather-beds are more injurious to the health of children, than even of adults, and especially if they are weakly.

In very cold climates feather-beds are often necessary, and in the United States the aged may often require them, in order to preserve or increase their heat, which is sometimes inconsiderable, and if lessened would prevent their sleeping.

The bed-clothes should also be as light and as cool as possible in the spring and summer; and in the winter they should be just sufficient to preserve a comfortable degree of warmth. Young people and invalids, in particular, ought to avoid many and heavy bed-clothes. The head should be only lightly, or rather not at all covered. The use of curtains to the bed should be avoided; at least, they ought not to hang down low, nor be drawn in any degree around the bedstead. It is impossible, indeed, to conceive what possible advantage can result from curtains to a bed; they cannot with propriety be used to exclude light or cold, because the former should be excluded by window-blinds, or curtains; and as it respects the latter, it is far better guarded against by a sufficiency of bed-clothing. Curtains are injurious, by preventing the proper circulation of the air breathed by those who occupy the ced, and by accumulating dust, cause it to be inhaled into and irritate the lungs.

The bed, as well as the bed-clothes, should be kept strictly clean, and carefully guarded against damp. Beds are apt to become damp for want of proper airing when not constantly used; from the dampness of the room, and from the coverings not being perfectly dry when laid on the bed. Colds, rheumatism, and even more fatal complaints, may be caused by occupying a damp bed. It would be, in general, a more judicious practice if beds, instead of being made up soon after the persons rise from them, were turned down, or their coverings were thrown separately over the backs of chairs, and thus exposed to the fresh air from the open windows during the day.

Bed-Chambers.—A bed-chamber ought not to be situated on the ground floor; and an elevated apartment is particularly recommended to literary and sedentary people. It should be airy, large, and lofty, and never a small confined room. Nothing can be more imprudent or absurd than the conduct of those who have splendid houses, preferring to sleep in small apartments. The more airy a bed-room is, the better; and it will be still better if it be also exposed to the influence of the sun. A bed-room ought to be well ventilated in the daytime, as it is principally occupied in the night, when all the doors and windows are shut. The windows should be kept open as much as the season will admit of, during the day; and sleep will probably be more beneficial, in proportion as this rule is practiced. Indeed, nothing is more material, not only for invalids but for persons in health, than the admission of pure air into their bed-rooms by various ways, and in different degrees, according to circumstances.

Keeping open the windows of bed-rooms during the night, ought never, however, to be attempted, but with the greatest caution.

It is imprudent to sleep in a very warm room, as it makes one faint, and relaxes too much the whole system.

Unless there is an apprehension of damp, a bed-room should rarely have a fire in it, as it has a tendency to vitiate the air, often fills the room with dust and ashes, and sometimes may be the means of setting the apartment on fire. If a fire is kept in a bed-chamber, the danger arising from a confined room becomes still greater; numbers have been stifled when asleep, by having a fire in a small close apartment. They who live in hot countries ought to be very particular regarding the place they sleep in. The apartment should be roomy, dark, shaded from the rays of the sun and moon; temperate as to heat and cold, and rather inclined to coolness than heat; while a free admission of air is allowed during the daytime, the windows should be carefully closed as soon as the night sets in.

It is a good rule for those who are obliged, on account of business, to spend the day in crowded cities, to sleep, if possible, in the country. Breathing fresh air in the night-time will, in some measure, make up for the want of it through the day. This practice would have a greater effect in preserving the health of those who reside in cities, than is commonly imagined. It is hardly necessary to observe, that in consequence of the chilly air of the first, and the noxious exhalations which fill the second, damp and filthy bed-rooms ought to be particularly avoided, as they are in the highest degree injurious to those who occupy them.

Dreaming.—Dreaming indicates an imperfect state of sleep, insufficient to produce that degree of refreshment which is essential to the maintenance of health. Many dreams, also, are of a peculiarly painful, disagreeable, or disgusting character; on these accounts, therefore, dreaming should as much as possible be avoided. Dreams, especially those of a harassing and disagreeable kind, are most generally experienced by persons laboring under a state of nervous excitement, produced by indolent and luxurious living—by intemperance, or by the undue indulgence of the passions and other mental emotions. As a general rule, dreaming may be prevented by whatever causes perfect and uninterrupted sleep; such as sufficient exercise during the day, temperance in eating and drinking, a cheerful and contented mind, and the avoidance of late or heavy suppers, or of strong tea or coffee during the evening. It is very generally the individual who retires to bed with his stomach overloaded with food, or laboring under irritation from its contents, even when these are moderate in quantity, if they be of a very stimulating or indigestible nature, that suffers from attacks of the nightmare, which, independent of the agony they produce, are by no means unattended with danger. It has been presumed, and not without strong probability of truth, that many of the sudden deaths which take place during the night, of persons apparently in the full enjoyment of health, are to be attributed to nightmare.

The *nightmare* is a certain uneasy feeling during sleep, as of great anxiety and difficulty of breathing, and a strong but ineffectual effort to shake off some incumbent pressure, or to relieve one's self from great inconvenience. The imagination is generally at work to find some cause for the unpleasant feeling, and pictures some monstrous shape as the author of the mischief. It commonly arises from an imperfect and unhealthy digestion, from flatulence, from heavy suppers, and from a constrained uneasy posture of the body. Such persons as are subject to nightmare should take no food whatever in the evening, should pay attention to the state of their bowels, and should sleep upon a mattress with the head and shoulders raised.

THE PASSIONS.—The passions are a natural and necessary part of the human constitution, and were implanted in it by the great Creator for wise and useful purposes. Without them we could have no motive to action, the mind would become utterly torpid, and, there being no foundation for morality or religion, virtue and vice would be nothing more than indiscriminate and unintelligible terms. The passions are only prejudicial when allowed to exceed their proper bounds, or are excited by improper objects; and to preserve them within their just limits, and to give them their proper direction we are furnished, not only with reason and the light of nature, but likewise with that more certain guide, the light of revelation.

From the intimate though mysterious connection between the mind and body, they reciprocally affect each other, and hence the passions exert a powerful influence over health and in the production and cure of disease. The two great sources of the passions respectively are desire and aversion; those of the former class tending in general to excite, and of the second to repress, the powers of the animal system. The chief passions which arise from desire are joy, hope, and love; and the most eminent in the train of aversion are fear, grief, and anger.

Joy is a passion in which the mind feels a sudden and extraordinary pleasure; the eyes sparkle, a flood of animation overspreads the countenance, the action of the heart and arteries is increased, and the circulation of the blood becomes more vigorous. Instances are not wanting in which this passion, when unexpectedly excited and violent, has produced disease, or even immediate death; but when moderate, and existing only in the form of cheerfulness, it has a beneficial effect in preserving health, as well as in the cure of disease.

Hope.—Of all the passions *hope* is the mildest; and, though it operates without any visible commotion of the mind or of the body, it has a most powerful influence on the health of the one and the serenity of the other. It contributes, indeed, so much to the welfare of both, that if it were extinguished, we could neither enjoy any pleasure in this life nor any prospect of happiness in the life to come; but, by the beneficent will of Providence, it is the last of the passions that forsakes us.

Love is one of the strongest and most absorbing passions with which the mind is affected, and has at its commencement, when happy and properly guided by reason, a favorable influence on all the functions of the body; but being often in its progress attended with other passions, such as fear and *jealousy*, it is liable to become the source of infinite disquietude. No passion undermines the constitution so insidiously as violent and unreasonable or misplaced love. While the whole soul is occupied with the thoughts of a pleasing attachment, both the mind and body become languid from the continuance of vehement desire; and should there arise any prospect, real or imaginary, of being frustrated in its gratification, the person is agitated with all the horrors and pernicious effects of *despair*. Love, when violent and unsuccessful, frequently produces a wasting of the body, terminating sooner or later in death.

Fear has its origin in the apprehension of danger or evil, and is placed, as it were, a sentinel for the purpose of self-preservation. When intense or habitually indulged in, it destroys the energies of both mind and body, retards the motion of the blood, obstructs digestion, and prevents the proper nutrition of the body. Violent terror has been known, in an instant, to turn the hair perfectly white, and in other instances to produce fatuity of mind or even instantaneous death. By weakening the energies of the system, this passion disposes greatly to disease during the prevalence of epidemics.

Grief.—There is no passion more injurious to health than *grief*, when it sinks deep into the mind. By enfeebling the whole nervous system, it depresses the motion of the heart and retards the circulation of the blood, with that of all the other fluids; it disorders the stomach and bowels, and ultimately every other organ of the body, producing indigestion, consumption, and other chronic diseases; obstinate watchfulness is a very common effect of grief. It preys upon the mind well as the body, and is nourished by indulgence to the utmost degree of excess. During the violence of its earlier period it spurns at all the consolations either of philosophy or religion; but, if life can subsist till the passion be alleviated by time, and submit to the cheering influence of company, exercise, and amusements, there is a prospect of recovery, though grief long continued often gives a shock to the constitution that nothing can retrieve. Grief, like fear, predisposes to an attack of epidemical diseases.

Anger is a passion suddenly excited, and which often no less suddenly subsides. Equally furious and ungovernable in its nature, it may justly be considered as a transient fit of madness. The face, for the most part, becomes red, the eyes sparkle with fury, a violent commotion is visible in the countenance and pervades the whole body. The nerves are unduly excited; the pulsation of the heart and arteries, and with them the motion of the blood, are sometimes so much increased as to occasion the bursting of some of the minute vessels of the brain or lungs. The stomach, liver, and bowels are often violently affected by intense anger; digestion is always disordered, a violent colic is sometimes produced, and very often all the symptoms of jaundice. Thus it is often the immediate agent in the production of fevers, inflammations, spitting of blood, apoplexy, and other acute disorders. As anger is liable to be spent by its own violence, it is commonly of short duration; but when existing in a more moderate degree, and combined with sadness or regret, it gives rise to fretting, which is extremely pernicious to the health. All the passions, but more especially anger and fear, are increased in intensity, and caused to exert a more frequent influence over the mind, by a life of luxury and intemperance. Hence, an essential means for their subjection is a regular, active mode of life, a mild and moderate diet, and the abandonment of all intense excitement and stimulating drinks.

Anxiety of Mind.—A state of mind altogether adverse to health; when constantly indulged in it destroys the digestive powers of the stomach, impairs the functions of the lungs, disturbs the regular circulation of the blood, and impedes the nutrition of the system. It is a fruitful source, in civil life, of chronic affections of the stomach, liver, heart, lungs, and brain. Even the anxiety induced in a sensitive mind by the ill-humor, caprice, and unkind treatment of others, is deeply felt, and proves highly injurious to health.

CARE OF THE HAIR.—Under the ordinary circumstances of health, in conjunction with temperance and regular exercise, the only safe and effectual means of preserving the hair and of promoting its growth and beauty are the frequent use of the comb and brush and regular ablution.

Whatever has a tendency to impede the passage of the fluids by which the hair is nourished, from the root along the cavity which exists in the center of each hair, must necessarily prevent its proper growth, render it thin, and deprive it of its soft and glossy appearance. There can be little doubt that this is the effect, to a certain extent, of the practice of twisting the hair from its natural position, and of plaiting or firmly braiding it, pursued in obedience to the dictates of fashion by most females. The injurious consequences of such modes of dressing the hair can only be obviated by a daily resort to the comb and a hard brush, which, by disentangling, restores it to its natural direction, and freeing it from every restraint, enables it to receive a due supply of its appropriate fluids. The growth of the hair is not, however, always impeded by artificial means; this may result, also, from allowing it from neglect to become entangled and matted together—a condition to which it is extremely liable from its peculiar structure. Hence, under all circumstances, frequently combing and brushing it through its whole length is absolutely necessary to its proper preservation.

Independent of the good effects of these operations in rendering the hair pervious to the fluids which rise from its roots, they facilitate its development also by freeing the scalp from accidental impurities, facilitating the circulation through its vessels, and thus enabling it to perform freely its functions.

Another means of promoting the growth of the hair and insuring its permanency is by frequently cutting it. It must be very obvious that when kept short its fluids are less liable to be obstructed in their passage than when the hair is long, it being difficult in the latter case to preserve it straight, and to permit it to have its natural flow. It is in early life particularly that frequent cutting will be found highly advantageous.

Whenever the hair becomes thin and irregular, or its beauty is otherwise impaired, nothing is better calculated to restore its proper growth than cutting it short. Frequently cutting the hair also prevents it from splitting at the ends and growing forked—the occurrence of which, so common in young persons, gives it an extremely inelegant and ungraceful appearance.

In children, keeping the hair short is a circumstance of no little importance, and should not from any light consideration be neglected. Their health, and in some respect their beauty also, is prejudiced by a contrary practice. Nothing is more common than to see a luxuriant head of hair accompanied in children by paleness of complexion, weak eyes, and frequent complaints of headache. Upon this subject we find the following excellent remarks in a little work entitled "Advice to Young Mothers, by a Grandmother." We recommend their attentive perusal to every parent.

"The hair in children should be cut short until they are eight or nine years old, as the cooler the head can be kept the less danger there is of many maladies peculiar to that part of the body, especially water on the brain. Besides, there is good reason for believing that children who have a great quantity of hair are those most liable to eruptions, as scald-head, &c. It is, at least, certain that in them eruptions are very difficult to remove. The trouble, also, of keeping long hair sufficiently clean, and the length of time necessary for this purpose, is often a cause of much ill-humor and many cross words between children and their attendants, which it would be better to avoid.

"Mothers whose vanity may be alarmed lest repeated cutting the hair for so many years should make it coarse, may be assured they have no cause for this apprehension, provided the hair be kept constantly brushed. I have never seen softer, finer hair, than on girls who have had it kept short, like that of school-boys, until they were in their tenth year."

When there is any tendency to sores or eruptions on the head of children, fine combs are very apt to promote them. There is no doubt that the heads of young persons which are never touched by such combs may be preserved much cleaner, by strict attention otherwise, than such as are scratched and scraped every day. If any dirt appears on a child's head which a brush will not remove, that particular part should be rubbed with a towel and soap and water; but, in general; the brush will be found quite sufficient to keep it perfectly clean. The seldomer, indeed, a fine comb is applied to the head of an infant the better. When, however, those of ivory, tortoise-shell, or bone are used, the greatest care is necessary lest they wound the skin and produce a sore, or by unduly irritating it augment the production of the scurf they are often intended to remove.

Preservation of the Sight.—The following are the general rules for preserving the sight unimpaired for the longest possible period:

1. All sudden changes from darkness to light and the contrary should be avoided as much as possible.
2. Avoid looking attentively at minute objects, either at dawn or twilight, and in dark places.
3. Avoid sitting near a dazzling or intense light, as of a lamp or candle, and facing a hot fire.
4. Avoid reading or sewing much by an imperfect light, as well as by artificial lights of any kind.
5. Avoid all dazzling and glaring sunshine, especially when it is reflected from snow, white sand, or other light-colored bodies.
6. Avoid dust, smoke, and vapors of every kind, which excite pain or uneasiness of the eyes.
7. Avoid rubbing or fretting the eyes in any manner, and wiping them with cotton handkerchiefs.
8. Avoid much exposure to cold northwest or easterly winds.
9. Avoid all spirituous and heating liquors, rich and highly-seasoned food, and every species of intemperance, all of which invariably injure the eyes and impair their sight.
10. Some persons living in cities who have weak eyes find permanent relief only by a change of residence to the country.

Persons of this description will find an advantage in wearing some defense before their eyes, especially when exposed to heat, sunshine, or glaring lights. This will be best if of a green color. Spectacles that do not magnify, of the same hue, are well suited for this purpose.

Care of the Bowels.—Regularity of the bowels in reference to their natural discharges is of very great importance to health and comfort. An evacuation once in the twenty-four hours is the best standard of frequency; this, in general, takes place whenever the digestive organs are in a state of health. Some persons, it is true, are naturally inclined to costiveness, and without feeling any inconvenience pass several days or even weeks without a stool. In general, however, a costive state of the bowels arises from errors in diet, want of exercise, intemperance, or, in fact, from whatever reduces the tone of the system generally, and of course that of the digestive organs. Confinement to a diet composed chiefly of dry animal food or of food highly seasoned, the use of fresh bread, and of warm rolls and cakes, very generally induces a costive state of the bowels. Costiveness is very common also in persons who use little exercise or who pass the greater part of the day within doors in occupations of a sedentary character. Hence females are much more subject to it than males. Lying in bed to a late hour in the morning is unfavorable to a regular condition of the bowels. It causes costiveness, not only by increasing perspiration, but also by creating an inactive condition of the system generally.

Early risers, who pass several hours of the morning in walking abroad in the open air, if they be temperate withal, seldom complain of any want of regularity in their stools.

The daily use of wine, especially the red or astringent varieties, retards very materially the natural discharges from the bowels. The same effect takes place in persons who pass the greater part of their time in company, and who, from a false delicacy, resist the calls of nature. They who ride much on horseback, or in a carriage, and persons at sea, are said also to have a habitually sluggish state of the bowels.

The means of obtaining a regular condition of the bowels will be readily perceived from the foregoing enumeration of the causes by which costiveness is induced. In addition to early rising, daily exercise of the body in the open air, and abstinence from wine and ardent spirits; the diet should be composed principally of vegetable food. Plain soups, especially of veal and mutton, with the addition of the ordinary culinary vegetables, well boiled and not too highly seasoned, will be found a very excellent diet for those inclined to costiveness. Fresh fruits, perfectly ripe, or fruit cooked, with or without the addition of sugar or molasses, are gently laxative, and hence very proper articles to be eaten by such individuals. Spinach, when in season, and properly boiled, is also a very pleasant and wholesome vegetable for persons of costive habits. The same is true also of well-boiled cabbage and sour-crout, when these agree perfectly with the stomach. Bran-bread, or wheaten bread, with an admixture of rye or Indian meal, is better suited to the habitually costive than bread composed entirely of fine wheat flour. For drink, those troubled with costiveness should make use of water, either alone, or with the addition of a small quantity of sugar or molasses, or water slightly acidulated with some of the vegetable acids. A very pleasant drink is made by dissolving currant-jelly in water, or by pouring boiling water upon sliced apples or peaches, and allowing it to stand until cold. This acts gently upon the bowels, and hence tends to obviate costiveness. Buttermilk, or sweet whey, may likewise be occasionally drunk with advantage by those whose fecal discharges are defective; all ardent spirits and wines, especially those of an astringent nature, should be carefully avoided. The method recommended by the celebrated Locke for procuring a regular discharge from the bowels, is founded on correct principles, and should not be neglected; it is, "to solicit nature, by going regularly to stool every morning, whether one has a call or not." Such a practice will very often induce a habit which in time becomes natural.

To remove costiveness, individuals should be extremely cautious in resorting to purgatives, or those medicines, under whatever name they may be sold, which have the effect of inducing evacuations from the bowels. The frequent use of these articles, however mild their operation may appear to be, tends to disturb the stomach and bowels; and consequently to vitiate or retard digestion. As a consequence, the costive habit, to obviate which they are resorted to, is in fact increased, and with it the necessity for repeating the medicine more frequently, or of increasing its activity; and finally, a stool can never be procured without its use. In a very short time, from their use, the habitually costive experience invariably more injury than from the original complaint. It is always, therefore, more safe to remove costiveness by a proper diet and regimen than by medicine; and unless the costiveness is dependent upon deep-seated disease of the bowels, stomach, liver, or some other organ, by a proper attention to these measures, and perseverance in their use, it may very generally be overcome.

The Feet.—The proper care of the feet consists in defending them from cold and wet, by stockings and shoes of a proper texture and thickness, and so adapted in shape and size as to allow perfect freedom to the motions of the feet in walking, while they do not press unnecessarily on any part. The feet are extremely subject to the impression of cold, and when chilled, in consequence of the close sympathy between them and other parts of the body, disease is apt to be occasioned in some one of the internal organs. Hence, not only should they be protected always from cold and damp, but when accidentally wet, the shoes and stockings should be immediately changed, and the feet bathed in warm water, or rubbed perfectly dry with a coarse cloth. Tight and misshapen shoes are injurious, as well by preventing the individual from walking securely and with sufficient ease, as by causing a thickening of the cuticle over the joints of the toes, forming what are called corns, and which, by pressing upon the parts beneath them, are the cause of very considerable pain whenever walking is attempted. It is essential that the feet, as well as every other part of the body, should be kept perfectly clean by frequent ablutions.

Use of Tobacco.—Tobacco, *nicotiana tabacum.*—A well-known plant, which derives its generic name from Nicot, a French ambassador, and its specific name from the island of Tobago, whence it was introduced into Europe in 1560. When tobacco is first taken into the mouth and chewed, it excites nausea and disgust, and, if swallowed, the most violent sickness, faintness, and other distressing effects. In one or other of its forms, it has, nevertheless, become one of the most generally used articles of luxury, exhibiting thus a remarkable illustration of the wonderful power of custom, in reconciling us to those things which are at first the most disagreeable. Tobacco has fascinated all ranks of men, and the natives of every climate.

The attractions of tobacco seem to be owing to its narcotic properties, by which irritability is soothed, and serenity induced, as by opium and some other substances. In large quantities, and in those who are unaccustomed to it, stupor, giddiness, nausea, vomiting, and even death, are produced.

The effects of tobacco, though they resemble, in many respects, are considerably different from those of any other inebriating agent. Instead of quickening it lowers the pulse, and when used to excess, produces languor, depression of the system, giddiness, confusion of ideas, violent pain in the stomach, vomiting, convulsions, and death. Its essential oil is so intensely powerful that two or three drops inserted into a raw wound, prove almost instantly fatal. But when used in moderation, tobacco has a soothing effect upon the mind, disposing to placid enjoyment, and mellowing every passion into repose. Its effects, therefore, are inebriating; and they who habitually indulge in it may with propriety be denominated, in a certain sense, drunkards. In whatever form it is used, it produces sickness, stupor, bewilderment, and staggering, in those unaccustomed to it; and in those who habitually indulge in it, the digestive powers and tone of the stomach are always more or less impaired. There is no form in which it can be taken that it is not decidedly injurious and disgusting.

In the form of *snuff*, although a moderate quantity, taken now and then, may do no harm, yet when used daily, particularly in the extent to which habitual snuffers carry it, it is positively pernicious. By the habitual use of snuff, the membrane which lines the nose becomes thickened, the olfactory nerves blunted, and the sense of smell consequently impaired, if not destroyed. Nor is this all, for, by the strong inspirations which are made when the powder is drawn into the nostrils, some of it is pretty sure to escape into the stomach. The latter organ is hence directly subjected to a powerful medicine, which not only acts as a narcotic, but produces heartburn, and every other symptom of indigestion. If it were attended with no other inconvenience, the black, loathsome discharge from the nose, and swelling and rubicundity of this organ, with other circumstances equally disagreeable and disgusting, which it produces, ought to deter every individual from becoming a snuffer.

The *smoker*, while engaged at *his* occupation, experiences a much greater degree of enjoyment than the snuffer. An air of peculiar satisfaction beams upon his countenance; and as he puffs forth volumes of fragrance, he seems to dwell in an atmosphere of contented happiness. Smoking, nevertheless, pollutes the breath, blackens the teeth, wastes the saliva which is essential to perfect digestion, and injures the complexion. In addition to this, it is apt to produce dyspepsia, and other disorders of the stomach; and, in corpulent subjects, it disposes to apoplexy.

The observations made upon the effects of snuffing and smoking, apply, in a still stronger degree, to *chewing*. This is the worst way for the health in which tobacco can be used. The waste of saliva is greater than even in smoking, and as a portion of the active principle of the tobacco is invariably introduced into the stomach, serious derangements of the digestive organs are invariably produced. All confirmed chewers are peculiarly subject to dyspepsia and hypochondriasis; and many of them are afflicted with liver complaints, brought on by their imprudent habit.

TRAINING.—Among the nations of antiquity distinguished by their genius and political sagacity, it was a great object with their lawgivers and statesmen, to direct the education of youth, so as to produce in them the greatest possible aptitude for war, by increasing the development, health and vigor of their bodies. To this end, most of their celebrated games were directed; and the youth who participated in these, while they afforded to the moral philosopher examples of patriotic and generous emulation, furnished also to the painter and the statuary the finest models of the human form, and to the natural historian some curious results of the effect of external agents in promoting the growth and activity of the animal economy. It may be stated, in general terms, that the efforts of the *athletæ* were directed so to regulate their diet, exercise and sleep, as to produce the greatest possible strength of action and power of endurance; and we have the testimony of an inspired writer, that they who were ambitious of a crown of victory in the Grecian games, "were temperate in all things." In our own time, this art of bringing up the human constitution to its highest pitch of muscular vigor, and capability of enduring fatigue, pain and hardship, has been brought almost to a science; and though the ends to which it is commonly directed are far from sublime or virtuous, being principally those of prize-fighting, or walking for a wager, the whole process, and its results, present some curious facts in physiology, and illustrate in a very striking manner the importance of a well-regulate diet and regimen as a means of preserving health and increasing the vigor of the constitution under all circumstances; and the important service a well-directed system of training would render to the dyspeptic, and others laboring under chronic affections, or under a general reduction of the powers of life, produced by irregular or sedentary lives.

In a course of training, the great point is to regulate carefully the diet, and to give such food, as is at once nutritive and easily digested. As we have repeatedly stated in different parts of this work, animal food is the most nourishing, but requires a due proportion of vegetable aliment, to prevent bad effects from it on the constitution. Beef, mutton and venison are the most easily digested kinds of meat, and hence are almost the only kinds of animal food allowed to those who are under a course of training; the young of animals, as veal and lamb, and fat or oily food, as pork, are deficient either in their powers of nutrition or digestibility, and consequently are entirely forbidden. The vegetables allowed are potatoes, brocoli or turnips, and stale bread or crackers Pastry, pies and puddings are to be avoided, and all the varieties of spices and sauces. Vinegar and salt are the only condiments allowed The quantity of food cannot be specified; it must vary with the constitution of each individual.

The drink allowed in training is pure soft water. If wine is taken, it should be only in very moderate quantity, largely diluted with water, and white is preferred to red. Spirits in any shape, either plain or diluted, are never allowed, under any circumstances whatever.

The most essential particular in the art of training, is to regulate the exercise, and to take plenty of it. Both within and without doors, active exercise of various kinds must be taken. Walking, riding, fencing, quoits, tennis-ball, the dumb-bells, may all be practiced. As long as the perspiration is moderate and not debilitating, exercise may be persevered in from four to six hours a day, with the most decided increase of general health and muscular vigor. A free exposure to pure air is an essential requisite. The novitiate in training is recommended to go to bed early, and to sleep from seven to eight hours.

The above precepts contain the principal means for raising the body to its highest degree of health and perfection; and the diligent practice of them must, as experience testifies, have the best effects on the expansion and motions of the chest, on the development of the muscles, on the function of digestion, and on all the secretions of the body.

Bleeding.—The artificial abstraction of blood is often resorted to by persons in health, either to prevent the formation of too much blood in the system, or more generally with the pretense of preventing disease. But such a practice is in the highest degree improper; it can answer neither end; on the contrary, it is attended, if it be statedly or repeatedly resorted to, with the most injurious effects.

Persons so constituted as to make much blood, should carefully avoid all those causes which tend to augment it, especially an indulgence in animal food, wine and malt liquors: and when they are sensible of a considerable increase in the quantity, they should confine themselves to a light, frugal diet, consisting principally of vegetables, or for a time solely of bread and water—should sleep but very moderately, and take much active exercise. Nothing can be more opposed to reason and experience, than for such individuals to have recourse occasionally to the abstraction of blood by the use of the lancet, or cupping-glasses, in order to prevent too considerable a formation of this fluid; for habitual blood-letting invariably begets, under such circumstances, an habitual overfullness of the vessels, which calls incessantly for a repetition of the same supposed remedy. Some persons are in the habit of being bled every spring or fall, or at both these seasons; but, however robust the constitution, this is not a practice to be recommended, since, like all other periodical or repeated bleedings, it proves only a palliative remedy, which sooner or later greatly enervates the body, deranges its functions, induces a premature old age, and calls for a more frequent resort to the operation.

Habit.—This term, when applied to corporeal subjects, signifies the effect of frequent repetition in facilitating the performance of certain motions or trains of actions. A conspicuous illustration of the power of habit, is seen in the practice of musicians on various instruments. To play on any of these, required at first the closest attention of the mind, to exert the power of volition in directing the various muscular motions required; but by habit, those motions return in their proper order, without the slightest apparent effort; and even while the performer can think and talk on other subjects. When a child begins to learn the art of reading, the form of every letter, and the power of every syllable, demand his attention; but in maturer years, the eye glances over the page with the rapidity and certainty of instinct, and seizes the words before it, without the consciousness of an effort. The effects of custom or habit on the mind and body, are interesting in a metaphysical, ethical and physiological point of view. We are all the creatures of habit, and our circles of action, as Dr. Darwin calls them, return with astonishing and noiseless regularity. When the time of meals or of sleep arrives, though the stomach be not empty, nor the limbs fatigued, though the mind be occupied with other things, the usual sensation of hunger or drowsiness comes on, and we feel the want of something to which we have been accustomed. The repetition of certain motions, renders the muscles that perform them quick and strong, or prompt and steady in their action; hence the dexterity and skill of the watch-maker or philosophical instrument maker; hence the ease of the mechanical part of their art to the painter or sculptor; and the steadiness of the limbs and acuteness of vision of the mason and sailor, in the execution of their perilous occupations.

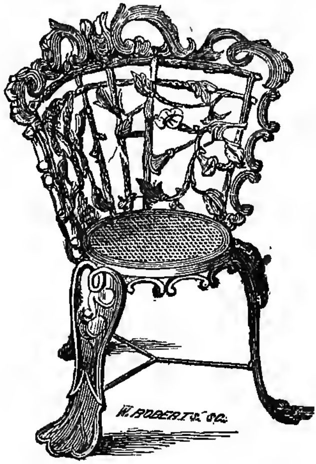
Good habits, early begun, contribute much to the preservation of the health. Early rising, temperate meals, and regularity in the alvine discharges, when early practiced and diligently persevered in, will give a degree of comfort and vigor unknown to the irregular and careless liver. Infants can very soon be taught the habit of feeding and of performing the usual evacuations at regular times. The action of medicines on the living body is much influenced by habit. A person who is accustomed to take emetics or purgatives requires, after a time, to have their quantity increased, and the opium-taker and dram-drinker require their poison to be either augmented in quantity or activity to produce the usual effects. By habit the most nauseous substances lose their disagreeable effects, and even infectious principles lose, to a certain extent, their power. Thus, the use of tobacco becomes a luxury, and prisoners have been known to occasion fevers in others by bringing an infectious miasm from their cells, where they themselves had been in the habit of inhaling it with impunity.

Idiosyncrasy is a peculiarity of constitution, rendering a person liable to be affected by certain agents differently from the generality of mankind. Thus, some persons are incapable of using butter or cheese; some are purged by honey; others cannot wear flannel without intolerable irritation of the skin; some have a violent fever and eruption, produced by the use of certain kinds of fish, or certain fruits, or malt liquors. Some people have idiosyncrasies with respect to medicines. Thus, opium and calomel have such very distressing or violent effects on some patients that they cannot be used by them as by others. Idiosyncrasies are to be discovered only by experience in each individual case, and where they are matters of indifference, it is needless to waste time in combating them; but where they may lead to disease, or interfere with methods of cure, a prudent physician will endeavor, if possible, to correct them.

FURNITURE AND RURAL STRUCTURES OF IRON.

THERE are several large manufactories of these articles in various parts of the country, and among the largest of them is that of Hutchinson & Wickersham, 312 Broadway, New York, who furnish all the articles nere named, and, for the convenience of our readers, we have procured and appended the prices at this establishment, as the knowledge of the cost is an important desideratum to those who wish to procure them.*

GRAPE CHAIR.



MORNING-GLORY CHAIR.

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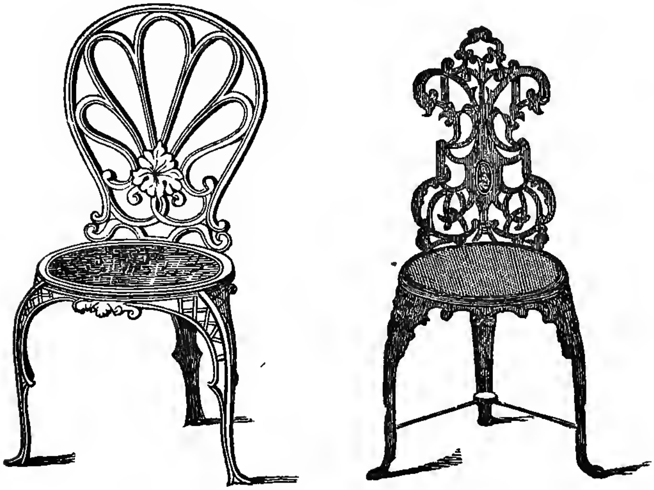
* HOUSEHOLD FURNITURE.—Among the various kinds of *iron chairs*, we may enumerate the "grape chair," $5 to $6, the "morning-glory chair," and the two hall chairs, each $4.50, the preceding being of cast-iron; and the following *wire* chairs, namely: the folding or traveling chair, $4.50—one figure representing it as closed for carrying, and the other as open and standing for use. The wire arm-chair is sold at $8.

Among the *settees*, the grape pattern, $9 to $15, is an especial favorite; the rustic settee, $10, is of lighter form, and the Gothic settee, $17 to $20, is best adapted to places where Gothic architecture prevails.

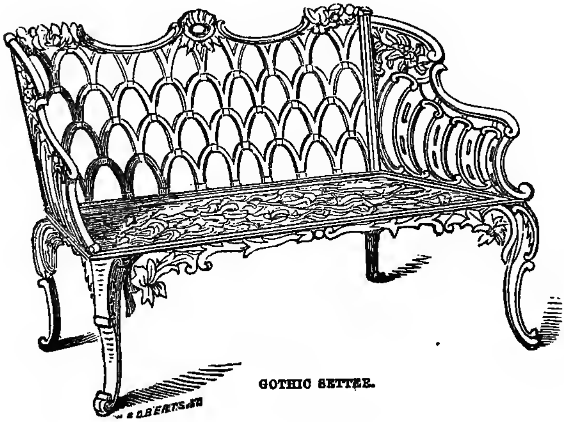
A neat umbrella-stand is shown, $1.50 to $6, and iron wash-stand, including crockery, $7, with looking-glass. A new and improved hat-tree is exhibited, $16 Many other forms of hat and umbrella stands are manufactured.

Iron bedsteads possess two most important advantages over those of wood—first, in their almost endless durability, and secondly in their entire freedom from bugs. They should, however, be substantially made, as the desire for a *cheap* article often induces a weak and flimsy structure, which does not stand firmly, and is liable to become bent by use. The one we present, when made of stout bars, is the simplest and one of the very best in use, although not so ornamental as some others, $4 to $6. Others of more elaborate patterns are made, $7 to $9. A *crib* is shown, the sides of which are left out, $10.

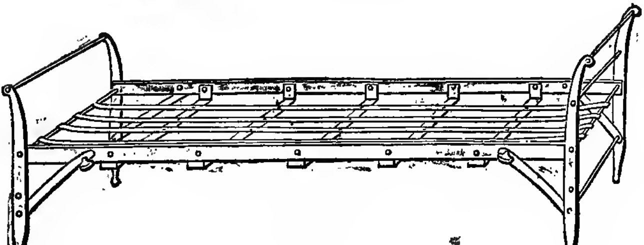
RURAL ORNAMENTS AND STRUCTURES.—Cast-iron vases are very durable ornaments on the more finished parts of grounds, and require only occasionally a small application of paint. We present a neat vase of this character, with its pedestal. The prices of these vases vary with their size, from $5 to $20, and the pedestals are about $5 each.—*Annual Register.*



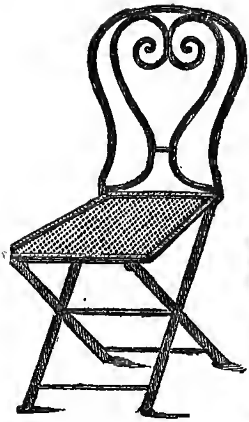
HALL CHAIRS.



GOTHIC SETTEE.

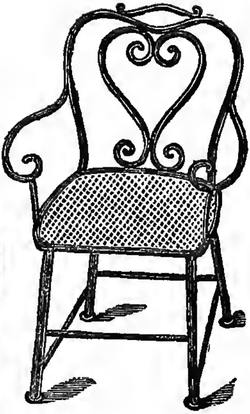


IRON BEDSTEAD.

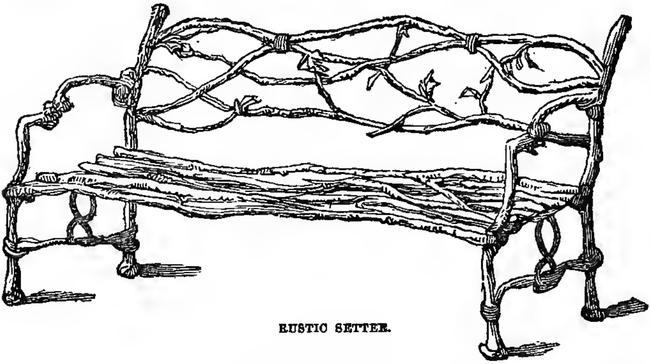


TRAVELING CHAIR.

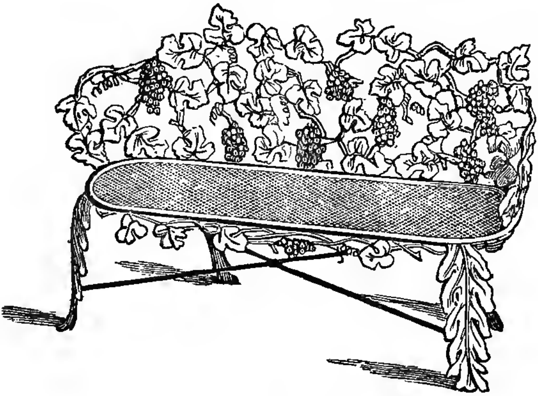
TRAVELING CHAIR FOLDED.



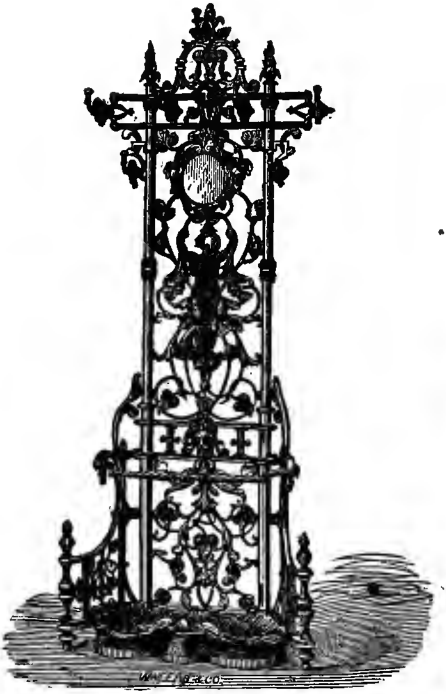
WIRE ARM CHAIR.



RUSTIC SETTEE.

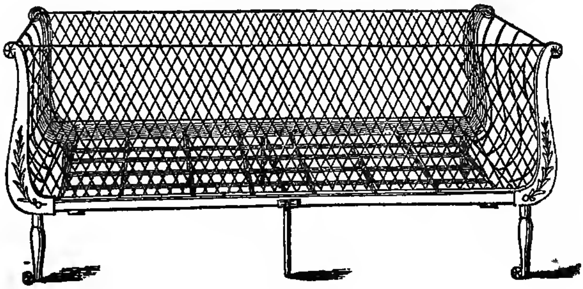


GRAPE SETTEE.

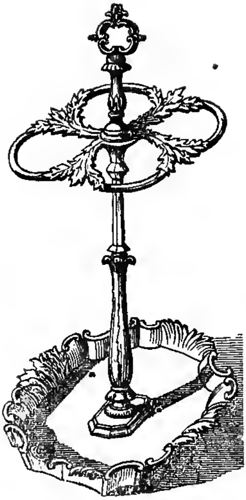


HAT-TREE.

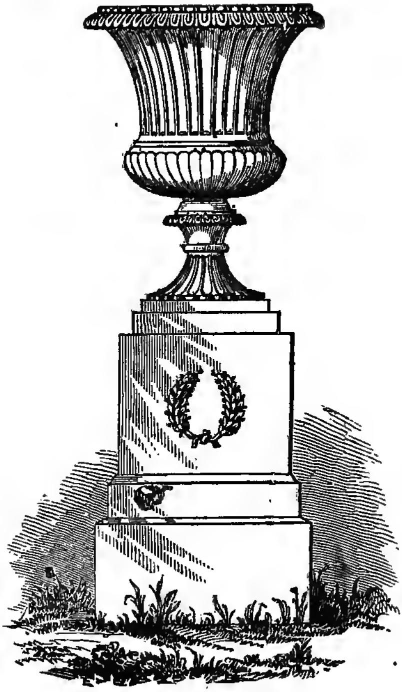
IRON WASH-STAND.



CRIB.



UMBRELLA-STAND.



VASE.

COMMON THINGS.

WHERE OBTAINED, HOW PREPARED, USES, ETC.

We cannot better conclnde this part of our work than by giving the following chapter *on Common Things*—those common articles and substances which, though in common use in our families, and whose names are household words, are still but imperfectly understood; and if questioned as to how prepared or whence procured, few comparatively could give intelligent answers. Hence the importance of the information which follows, and which will answer the many questions that arise in respect to the articles illustrated and explained.

TEA.—The leaves of a shrub grown chiefly in China and Japan; of which countries it is a native. It is an evergreen; grows to the height of from four to six feet, and bears pretty white flowers, resembling wild roses.

Those most cultivated are the *thea bohea* and *thea viridis;* it was formerly believed that these two plants produced the black and green teas, and from this belief they derived their names; but it is now proved that the difference arises in the mode of preparation, and either kind of tea can be made from either plant without any difficulty.

In China there are great numbers of tea farms, generally of small extent, situated on the upper valleys, and on the sloping sides of the hills, where the soil is light, and rich, and well drained. The plants are raised from seed, and generally allowed to remain three years before a crop of leaves is taken from them, as this operation of course injures their growth; even with care they become stunted, and unprofitable in about eight or ten years. When the crop is ready, the leaves are carefully picked by hand, one by one, and there are usually three or four gatherings in each year, the first crop in the spring being of the most value; a well grown bush, well treated, will produce two or three pounds of tea annually.

For green tea the leaves are only allowed to dry for an hour or two, after gathering, before they are thrown into heated roasting-pans, placed over a wood fire; they are stirred quickly with the hands, and allowed to remain for a few minutes; they are next rolled by hand on a table covered with mats, and afterward roasted and rolled again; the color is by this time set, and the after processes of sorting and refiring, which, for the finer sorts are repeated several times, may be deferred till a leisure time. In the preparation of black tea the leaves are allowed to remain a long time, say a whole day, drying before they are fired; they are tossed about and patted whilst cooling, and are finally dried, over a much slower fire.

The Chinese drink it pure; generally a handful of tea is put into a china basin or cup, and boiling water poured over it, which is renewed three or four times, till all the strength is gone; sometimes they add salt and ginger, and sometimes sugar, but not often. Tea-shops are very common by the road sides, and the road in front of them is usually thatched over, that those who stop for a cup of tea may be shaded from the sun.

Tea is sent from the farms to the coast for exportation, mostly by coolies, who carry the chests over the mountains till they reach some navigable river or canal, by which it can be conveyed to the coast. It is said to be a curious sight to watch, from the top of a wild mountain pass, long trains of coolies laden with chests of tea, which they carry on their shoulders or balanced at each end of a bamboo, winding along in one direction; and others returning laden with cotton goods and other merchandise received in exchange.

Tea has recently been introduced into some parts of North America, and also into the high valleys of the Himalaya range, where it appears likely to thrive.

Tea was first brought to Enrope in 1610, by the Dutch East India Company; and it must have been in use in England by the year 1660, as appears from an Act of Parliament passed in that year, in which a tax of 1s. 6d. was laid on every gallon of tea sold at the coffee-houses. There is also the following entry in Pepy's Diary, dated September 25th, 1561: "I did send for a cup of tea (a China drink), of which I had never drunk before." In six years more it had found its way into his own house as this entry shows: "Home—found my wife making of tea, a drink which Mr. Pelling the potticary tells her is good for her cold," etc. About this time the East India Company ordered "one hundred pounds weight of goode tey" to be sent home on speculation. The price was about fifty or sixty shillings the pound; and two pounds three ounces of the best tea was not deemed an unfitting present from the East India Company to the king.

Coffee.—Coffee is the seed of an evergreen shrub, the *coffea Arabica*, which is said to have been discovered in Abyssinia by the Arabs. It is chiefly cultivated in Arabia, the southern states of North America, Costa Rica, Brazil and other tropical parts of South America, the East and West Indies, Java, and Ceylon; but the climate of Arabia, where it was first cultivated, appears most suited to its growth; frequent rains and the brilliant, unshaded light of its almost cloudless sky, stimulate vegetation, and cause the secretion of those principles on which depends the delicate aroma.

Elevated situations are most suitable for the growth of coffee, and the plantations have much the appearance of English pleasure-grounds; the trees are raised from slips, which are allowed four or five years to grow before they are cropped; they attain the height of eight or ten feet, and continue in bearing about from thirty to fifty years. The shrub or tree resembles a handsome laurel, and bears a profusion of clusters of fragrant white flowers, which are succeeded by brilliant red berries, sweet and pulpy, which ripen to a purple color—each contains two coffee seeds or stones.

The only care required is the pruning of the trees and picking of the berries; after they are gathered they are pulped in a mill formed for the purpose, by which the beans, as they are called, are deprived of the surrounding pulp and outer skin. In a second mill they are peeled of their inner skin and winnowed; they are then dried in the sun on large open clay floors, picked over by hand, and finally packed in bags or barrels to be exported.

The beans are roasted, in a close revolving cylinder, over a clear but moderate fire; they should afterward be cooled quickly by exposure to the air, and then ground in a covered mill; the sooner the infusion is made after roasting and grinding the finer will be the flavor of the coffee.

Coffee was first used in England in the early part of the seventeenth century, probably a little before tea was introduced, as that beverage is first spoken of as being sold at the coffee-houses; it is said that the first coffee-house keeper in London was a Greek servant, named Pasqua, brought to England by a Turkey merchant to make his coffee. It appears to have been first used as a drink at Aden, thence introduced into Egypt, and thence into Turkey, where it is still very much in use. Dr. Livingstone, the African traveler, mentions that the coffee-tree was taken by the Jesuit missionaries to the western coast of Africa, where it has since become naturalized, and covers vast spaces of waste land.

Cocoa is the bruised seed of various species of *theobroma*, a tree which grows wild in the West India Islands, Brazil, and various parts of Central America, where it is generally found growing at the height of six hundred feet above the level of the sea.

The cocoa, or, as it should be written, *cacao*, tree is an evergreen, and it is said to bear some resemblance to a young cherry-tree; the leaves are large and simple, the flowers grow in clusters, the pods are not unlike cucumbers in form, and of a yellowish red color; they contain from twenty to thirty nuts, about the size of large almonds, violet or ash-grey colored, and containing each two lobes of a brownish-hue.

A wet soil is needful, and the plants also requiring shade, they are generally placed between rows of large trees, which renders the plantations very charming spots in tropical regions; the plants are raised from seed, and are seven or eight years in coming to perfection, but require so little attention that one man can superintend one thousand plants; the usual times of gathering the crop are in June and December, and not more than one pound and a half of seeds is the average produce of each plant. The fruit of the wild plants is frequently gathered.

The seeds, after being freed from the pod, are dried either in the sun or by artificial heat; they are then either simply bruised, which makes cocoa-nibs, or crushed between rollers, which makes flake cocoa; or they are ground and made into a paste, in which state they are very often adulterated.

Chocolate.—The cacao-beans are gently roasted, shelled, and reduced to a paste, when vanilla, cloves, cinnamon, rice, almonds, or starch, etc., are frequently added to it; it is put into moulds, and always improves by keeping.

It is called chocolate from *chocolalt*, the Mexican name for the cacao-tree. The produce of several of the finest kinds is not exported; the best that reaches us is from Caraccas, Guatemala, and Berbice.

The *chiccory* which is used to mix with coffee is the dried root of the *cichorium intybus*, a smallish plant which bears a beautiful blue flower of the composite form. The root is in form like a carrot, and from the crown spread a number of large succulent leaves. The seed should be sown in April, in rich, light soil; the crop is ready in September; the roots being taken up, washed, and cut into pieces two or three inches long, are dried in a slow oven or kiln; they are afterward cut into much smaller pieces, and roasted and ground just like coffee. It is much esteemed in France and Germany.

FOREIGN FRUITS.—The Orange-Tree, *citrus aurantium*, grows abundantly in almost all the warm soft climates of Southern Europe, Northern Africa, and many temperate parts of Asia and America. Those consumed in England are chiefly imported from Spain, Portugal, and the islands of the Atlantic, and of these St. Michael, one of the Azores, is famed for producing the best kind imported.

The orange-trees are usually branched almost, if not quite, from the ground; their leaves are evergreen, and their flowers white and very elegant; they yield a delicious perfume, sweet and almost luscious, yet one that does not cloy. On many trees, the flowers and ripe fruit hang together; and, when thus loaded—the fruit, some of light green color, others of a pale yellow, others of a deep orange, and all set off by the deep glossy green foliage—the trees are superb.

The fruit is gathered in December, or even earlier, a little while before it is ripe; and large baskets being filled by boys who take them from the gatherers, they are carried away at once to the packers, who most commonly sit in groups on the grass; the oranges are poured out in a heap with as little concern as if they were coals; each orange is wrapped in a husk of Indian corn, these are prepared by children, who hand them to a man, who wraps up the orange and passes it to another, who places it in the chest; this is all done with amazing rapidity. The box is full to overflowing, thin boards are bent over it by a carpenter, and secured with willow bands, and then it is ready to be carried to the port and shipped.

The Lemon-Tree, *citrus medica,* is a native of Assyria and Persia, whence it was brought first to Greece, and afterward to Italy, Portugal, and France; it is also frequent in our green-houses. It is a small and beautiful evergreen, with numerous branches and bright shining leaves; the flowers, which are white, and very sweet, are larger than those of the orange, and bloom the greater part of summer; they are succeeded by the pale golden fruit.

Lemons are brought from Spain and Portugal, and also from the West Indies; but the latter chiefly supply *limes,* which are the produce of the *citrus aeris.* They are smaller than the lemon, of an oval shape, thinner in the rind, and, though as acid, rather milder in flavor. Citrons are the fruit of another tree nearly allied to these; they are less acid, but the rind has a hot and bitter taste, and when candied, it is much used for flavoring cakes and puddings. Citrons are imported, both preserved and candied, chiefly from Madeira. Another species of *citrus* yields the scent known as bergamot, which is an essential oil distilled from the rind of its pear-shaped fruit.

Figs.—The fruit of the *ficus-carica,* which is a native of Asia, but was early imported into Europe; it flourishes in France, Spain, and Italy. The figs, when ripe, are dried in ovens, and packed in boxes and small baskets for exportation. The fig-tree seldom grows more than twelve feet high, but is very spreading, and bears large lobed leaves, which are annual in Europe, and perennial between the tropics.

Olives are the fruit of the *olea Europea,* which grows abundantly in all the countries bordering on the Mediterranean Sea. The olive-tree grows upon the most rocky calcareous soils, seldom exceeds twenty feet in height, but is much branched and spreading; it lives to a great age, and increases very much in bulk, so that one tree may easily at a little distance be mistaken for a group. There is an olive-tree at Pescio seven hundred years old, and twenty-five feet in circumference.

The leaves are evergreen, stiffish, and pointed; the flowers white, growing in clusters, succeeded by an oval *drupe* or plum, which is violet-colored when ripe, bitter and nauseous. The preserved olives, common as a table luxury, are the unripe fruit pickled in a strong solution of salt.

Salad-oil is made from olives. The ripe fruit is gathered in November, and bruised in a mill, the stones of which are set so wide apart as not to crush the nut or kernel; the pulp is then gently pressed in bags made of rushes; the first oil that flows is of the most value, a second quality is obtained by breaking the refuse, mixing it with warm water, and returning it to the press; and after this a third very inferior kind is obtained.

The Pomegranate-Tree, *punica granatum*, is a native of the south of Europe, Asia, and Barbary; but in the West Indies, where it has been introduced from Europe, its fruit is larger and better flavored than in its native climates. Where the tree thrives, it rises twenty feet high, throwing out branches even from the bottom; the leaves are pointed, and of light brilliant green, both the calyx and corolla are of a bright red color, the latter is the most brilliant.

The pomegranate is a pulpy, many-seeded berry, of the size of an orange, globular, covered with a thick coriaceous rind, and crowned with the calyx, which is sharply thorned. The red succulent pulp is pleasantly acid, and was made into wine by the ancients.

Cocoa-Nuts are the fruit of the *cocos nucifera*, or cocoa-nut palm, a lofty and elegant palm-tree, which grows abundantly in most tropical countries; it is from fifty to sixty feet in height, its simple column-like stem being crowned with a beautiful plume of feathery leaves from twelve to fourteen feet long. The nuts grow in several long clusters depending from the base of the leaves; they are about the size of a man's head, the thin outer rind covering a large mass of fibers which are used in many countries for making mats, cordage, and coarse sail-cloth. Within this fibrous coating is the shell of the nut; which is oval, and very hard, and often serves for a drinking-cup. The kernel is firm, white, and pleasant; the interior hollow, and filled with sweet milky juice; when unripe, it is entirely filled with this juice.

The Date is the fruit of a tall and graceful palm, *phœnix dactylifera*, abundant in Barbary, Arabia, Persia, and the adjacent countries, particularly on the confines of the deserts and in the oases. The fruit somewhat resembles a plum, but is rather longer in proportion; it contains a long oblong kernel, grooved on one side. The pulp is soft, sweet and slightly a stringent.

In many places they form the staple food, and the crop of dates is as anxiously expected as our wheat harvest, or the vintage of southern Europe. The fruit when gathered quite ripe is often pressed into large baskets, and thus forms a hard, solid cake called "adjoue," which is afterward cut up and sold by the pound. Date-stones are soaked in water and given to the cattle.

Almonds are imported from Spain and Italy, but they grow spontaneously in many other warm countries. The almond-tree, *amygdalus communis*, greatly resembles the peach, in growth, leaves, and blossoms; it flowers in the early spring, and produces fruit in August. The fruit is covered with a tough skin and is inclosed in a rough shell. There are two kinds of almonds, the sweet and the bitter; only differing from each other in the flavor of the nut. Valentia almonds are sweet and large; Italian not either so large or sweet; Jordan almonds come from Malaga, they are long and not very pointed, and are the best kind imported; the bitter almonds come chiefly from Mogadore on the northern coast of Africa.

Brazil-Nuts are the produce of the juvia, *bertholler excelsa*, a lofty and magnificent tree, abounding on the banks of the Orinoco and the northern parts of Brazil. The nuts, which are triangular, and covered with a hard, rough shell, are contained to the number sometimes of fifty in a woody outer shell, which is often as large as a child's head; it is divided into six compartments. They are highly prized by the natives, and largely exported to Europe.

Raisins are dried grapes; prepared either by cutting the stalk of the bunches half through when they are nearly ripe, and leaving them on the vine till the sun dries and candies them; or else they are gathered when fully ripe, dipped in a ley made of vinewood ashes, and dried in the sun. Inferior kinds are dried in ovens. Raisins are chiefly imported from Spain, Turkey and Italy. Of these, the ones from Smyrna are the least esteemed, and those from Malaga the most. The finest of the Malaga raisins are those made from the Muscatel grape. Fresh grapes are also imported from Spain and Portugal, packed in jars with saw-dust.

Prunes and French Plums are dried plums imported from France; in the southern parts of which country all kinds of plums grow abundantly. The common sorts are packed in baskets; but the finer sorts, intended for table fruit, are carefully gathered and dried, and packed in small elegant boxes, which are ornamented in various ways with the characteristic good taste of the French. The preparation of these boxes gives employment to a great number of persons.

The Pine-Apple, *bromelia ananas*, is a tropical fruit of fine flavor and very luscious. The plant consists of a few leaves round a stalk, then the soft, pulpy, juicy pine, covered over with conical excrescences, and surmounted by a crest of stiff prickly leaves. It is often cultivated in our English hot-houses, as well as imported from the West Indies and other tropical countries.

Tamarinds are the preserved fruit of the *tamarindus Indica*, which is a native both of the East and West Indies, and probably of most parts of Arabia and Africa. It is a large forest tree, and affords excellent timber—hard, heavy, and durable; the leaves are pinnate, like those of the mountain ash, and of brilliant green. The pods grow in bunches of five or six, they contain from three to six glossy seeds, and are filled with a stringy pulp. In the West Indies the ripe pods are gathered and packed into a cask, which is then filled up with hot syrup; in the East Indies they are preserved without sugar. The pod of the variety which is found in the East are about double the size of those which grow in the new world.

THE SPICES.—Cinnamon is the bark of a small tree, the *cinnamonum Zeylanicum*, which, as its name imports, is a native of Ceylon, and chiefly cultivated there, though it is raised also in Java. The tree is very graceful, the leaves, which are red in spring, become thick, leathery and glossy green as the summer advances; they are netted with raised veins on the under side, and are placed opposite each other on the stem. The flowers are greenish white, and grow in small loose clusters at the termination of the branches.

The trees require a rich, light soil, and also shade; they are, therefore, planted in open glades of the forest, where a few large timber trees remain to shelter them; this greatly contributes to the beauty of the cinnamon harvest, when the natives assemble to strip the bark: their graceful figures and bright-colored clothing forming picturesque groups in the forest glades, and the whole air being loaded with the scent of the spice. Cinnamon peeling begins in May, at the end of the rains, and lasts till November. The peeling simply consists in slitting the bark, and cutting it across, so as to turn it back; it is then soaked, to remove the outer rind, and rolled up into quills about three feet long, and is then fit for exportation. Cinnamon has a warm, pleasant aromatic taste, and is slightly astringent.

Cloves are the flower-buds of a tree, gathered before they open, and dried in the sun; the round ball is the corolla surrounding the stamens, &c., and the shaft is the calyx tube. The odor of cloves is strong but agreeable—the taste very aromatic and warm; the name is said to be derived from the French "clou," a carpenter's nail, which they are thought to resemble.

The tree which produces Cloves is the *caryophillus aromaticus*, a small evergreen, with long shining leaves, and short terminal bunches of sweet-scented flowers. It is a native of the Moluccas, whence it has been taken to almost every tropical country. A tree twelve years old, will yield from five to twenty pounds of cloves annually; when older, perhaps sixty pounds, and as a single stem may live one hundred and fifty years, the produce is almost incredible.

Nutmegs and Mace are the produce of a tree, the *myristica moschata*, which is a native of the Moluccas, and is cultivated both in those islands and in Java, Sumatra, and the West Indies. The fruit of this tree resembles a peach in size and shape; when ripe, it readily splits into two parts, showing the kernel or nutmeg surrounded by the mace in the form of a sheath.

There are generally three gatherings in a summer, the first in July or August, the last, which yields the best crop, in April. The mace is red when gathered, but in drying becomes yellow; on removing the mace a shell is found, inside which is the nutmeg. The nutmegs when gathered are sorted, and dipped into lime-water to preserve them from insects.

Pepper is the fruit of a climbing or creeping plant called *piper nigrum*, which has alternate leaves, jointed stems, and spikes of naked flowers; the berry is small, round and fleshy. This plant grows abundantly in Sumatra, Java, Borneo, and the Malay Peninsula. The pepper vines, as they are called, are trained to trees and shrubs, and are allowed to grow four years without gathering the crop; this takes place while the berries are still green, before they are ripe, and they are dried quickly on mats in the sun, which turns them black, therefore it is called black pepper. White pepper is produced by soaking the dried berries till the outer skin peels off readily.

Long Pepper is the fruit of the *piper longum*, also a native of the East Indies; in long pepper the spike and half ripe berries are all dried together, which makes it resemble the catkins of the birch; the flavor is like black pepper.

Cayenne Pepper is the dried and ground fruit of the *capsicum*, a genus of plants related to the woody nightshade. These fruits are fleshy, and bright scarlet or orange, very pungent, and much used in flavoring, both in their unprepared state and ground.

There are two principal species, *capsicum annuum*, a plant which grows wild in South America and the West Indies; and the far hotter *capsicum fruiticosum* of the East Indies, a shrub which bears much smaller fruit. Capsicums are very useful to the inhabitants of hot climates, rousing the digestive organs when impaired by the great heat; even birds and animals have recourse to them, and have been known to die, when deprived of them, for want of the stimulus to which they have been accustomed.

Chili Vinegar is vinegar in which Capsicums have been steeped till it is thoroughly impregnated with their flavor.

Ginger is the root stock of the *zingiber officinalis*, the narrow-leaved or common ginger; a plant with grass-like leaves, and spikes of irregularly formed flowers; it is a native of the East Indies, but grows in most tropical countries. When cuttings are planted out in spring, in three or four months they have acquired a mild aromatic flavor, and are fit to make preserved ginger, but for the ginger of commerce they must be at least one year old.

It is prepared either by scalding, peeling, and drying in an oven, in which case it is called black ginger, or by simply peeling and drying in the sun, which is called white ginger.

Cardamoms are the aromatic capsules of various species of *amomum*, a plant related to the *zingiber*, all the species of which are splendid plants, remarkable for the beauty and richness of their flowers. Cardamoms come chiefly from Malabar, Madagascar and Sumatra; they are warm aromatics, and are much used in the East to flavor rice and other insipid food; in England they are also used in medicine.

Pimento or Jamaica Pepper, otherwise called allspice, is a warm spice grown in the West Indies. Like black pepper, it is a small berry, gathered unripe and dried in the sun; but it grows on a largish tree, the *eugenia pimenta*. As an aromatic stimulant, pimento stands between pepper and cloves, for the last of which it may often be substituted, being so very much cheaper.

Capers are the flower-buds of the *capparis spinosa*, a native of the south of Europe, where it grows all over the rocks and ruins, decorating them with its showy blossoms, which are large and white, with a long tassel of lilac stamens springing from the center of each. The flower-buds have a sharp acrid taste; their quality depends on their age, the youngest being of the most value; each bush yields about a pound of capers annually.

CHINA, PORCELAIN, etc.—China, like all other kinds of earthenware, was originally a lump of clay; it was moulded into various forms, and then baked and glazed afterward.

Porcelain.—All kinds of pottery, from the finest to the coarsest, are composed of two ingredients, clay and flint baked together; but in porcelain these are of such kinds, and in such proportions, that the product is a semi-vitrified compound, in which one portion remains unaltered by the intensest heat, while the other vitrifies or becomes glass, and enveloping the particles of the infusible ingredient, produces the smooth, compact, shining, semi-transparent substance we call porcelain.

The first part is the preparation of the clay. That from which English porcelain is composed is mostly found in Cornwall, Devonshire and Dorsetshire. The clay from the first named, which is considered the finest, consists of decomposed felspar of granite, which is the rock most abounding in that county. The clay merchants prepare it by the following method, and send it to the potters under the name of china clay. The stone is broken up and laid in running water, the clayey, or, as they are called, argillaceous parts being the lightest, are carried off in suspension, while the quartz and mica, which were united with them in the granite, fall soon to the bottom. At some distance these rivulets end in catch-pools, where the water is arrested, and after time has been allowed for the pure clay with which it was charged to settle and form a deposit, it is drawn off, and the clay dug out in square blocks, which are placed on shelves to dry in the air. It is now a hard, white mass, which can, by crushing, be reduced to an impalpable powder.

The lumps of clay are first pounded and mixed with water to the consistence of cream, by means of various beating and cutting implements; the pulp is then strained through several sieves, each one finer than the last. The next process is preparing the flints, which are first burnt in a kiln and thrown red-hot into cold water, and afterward ground in water to an impalpable powder; the two dilutions of clay and flint are then brought together, stirred very thoroughly and again strained; and so great is the affinity between them, that, even when wet, they unite and form a mortar which no action of the atmosphere can decompose. This fluid mixture is called "slip," and is gradually evaporated in what are called "slip-kilns" to a consistence like dough. It leaves the slip-kiln full of air bubbles, which must be worked out by elaborate treading and kneading, generally with the naked feet, and after this is done it should be left a long while before it is used, that the two elements may the more intimately unite. If placed in a damp cellar the blocks of slip undergo a kind of fermentation, by which all traces of animal or vegetable matter which they may have contained are decomposed and got rid of; and this greatly improves its quality. So sensible are the Chinese of this, that they extend the interval over fifteen or twenty years, and a parent will often provide a sufficient stock for his son's life.

In shaping vessels there are three modes in use, throwing, pressing, and casting; throwing is performed on a kind of lathe, which consists in a contrivance by which a small circular board revolves very rapidly, and on this the clay is measured and its intended shape given to it, by the pressure of the fingers and palms of the potter's hands. This instrument is the *potter's wheel*, which is of the highest antiquity, being apparently as old as the art itself, nor does its form and mode of use seem to have undergone much change during these long ages. In the catacombs of Thebes in Egypt, which have been proved to have existed nineteen hundred years before Christ, there have been discovered paintings representing various processes of the potter's art, and among these is a delineation of a potter's wheel indentical in principle with those now in use. The clay vessel thus moulded is then partially dried before transferring it to the turning lathe, where it is reduced by sharp tools to the required thickness, and its form carefully finished off; it next passes to a man who applies handles, spouts, and all other small appendages, these are fastened on with slip; all these small irregular-shaped pieces are made by pressing in moulds formed of plaster of Paris; and plates, saucers, and other shallow vessels are formed in a mould which is made to revolve on the block of the lathe, and into which the work man presses the clay with his hand.

They are put into a furnace inclosed in deep clay boxes called *seggars*, capable of sustaining the most intense heat; these protect the ware from the flame and smoke; the process of baking lasts from forty-eight to fifty hours, the heat gradually increasing; trial pieces are placed where they can easily be abstracted, to see how the process goes on, and when it is finished the fires are put out, and all is left undisturbed twenty or thirty hours to cool.

Bisque or biscuit is the name given to the ware after its first baking. It is so called from its resemblance to ship-bread; many small vases, figures, and other articles of ornament are sold in this stage. The ware is afterward glazed by being dipped in a compound of litharge of lead and ground flints, glass, or some similar ingredients mixed with water to the consistency of thin cream. The workman employed stands by a large tub or other reservoir, and, taking up the pieces of ware so that the smallest possible portion shall be covered by the fingers, he dexterously plunges it in, taking care that the glaze is equally distributed all over the article—it then passes to a woman who scrapes off any superfluous glaze adhering to it. A skillful workman will dip about seven hundred dozen plates in a day. It is worthy of remark that the glaze when applied is perfectly opaque, so that any painting or printing with which the article may have been ornamented is not visible until it has been fired. This second baking is done in a gloss oven, the heat converts the flint, etc., into a thin coating of glass.

The next operation is painting, which requires to be done with peculiar metallic colors, united to a flux; these colors are moistened with gum-water or a peculiar oil, which causes them to adhere to the surface of the china until it is subjected to a slight firing sufficient to fuse the glass or flint with which the colors are united; the paintings are thus burnt in, and acquire a gloss equal to the rest of the surface. Professed artists are employed for ornamenting china in this manner, and the most exquisite designs are frequently produced. For the common ware a much simpler process suffices, and this is done *before* the glazing instead of *after* it, as is the case with the painting. The pattern is printed from a copper-plate, on a thin paper, and this is transferred to the ware in the state of biscuit, when the color remains and the paper is removed; the glazing then proceeds as already mentioned. Gold is applied to the finer wares in a metallic state, and after burning on, requires burnishing with agate or bloodstone.

China derives its name from the country whence specimens of the manufacture were first brought to Europe, and porcelain from *porcellana*, the Portuguese for a little cup; the first traders in the article having been of that nation. In China the earths which they use, *kao-lin*, a soft substance full of glittering particles, and *pe-tun-tse*, which is brilliantly white, fine, and soft, bear the same relation to each other that our clay and flint do; indeed the china clay of Cornwall, the most valuable to the potter, is proved to be identical with the kao-lin of the Chinese. They form their vessels as we do, but fire them only once, subjecting them, however, to far more intense heat, as many of their glazes would not vitrify at a lower heat than would suffice to fuse Cornish granite.

The manufacture is chiefly carried on in the town of King-te-ching, where immense multitudes are employed in it. Father Entrecolles, a French missionary, who resided in China in the early part of the last century, has given many interesting particulars of this manufacture, which appears to have been quite as large and active then as now; three thousand ovens were then to be seen at work at once, giving to the town the appearance of one great furnace. Some idea of the antiquity of the art in China may be obtained from the fact that small china flasks, with inscriptions in Chinese characters, differing little if at all from those in use in the present day, have been found in some of the tombs of Thebes; thus appearing to prove not only that the Chinese possessed at that early date the art they have been so long celebrated for, but also that they knew and traded with the Egyptians. It has been shown that the Egyptians were potters themselves; and many little figures, covered with a fine deep blue glaze, are found deposited with their mummies, which may either have been made by themselves or obtained in trade from the Chinese or Phœnicians; nor were these the only nations of antiquity who practiced this art. It seems to have been more widely spread than most others, and there are few nations removed one step from barbarism who have not made for themselves drinking and cooking utensils of rude pottery.

Chinese porcelain is ornamented in a very queer style, and the division of labor being great among them, and carried even into their designs, different workmen, without any concert or plan, paint successive parts of the same group or picture, which contributes to the grotesque effect of their work; the effect is also heightened by their ignorance of perspective. They make, beside common china, several others: a black kind, much esteemed in the East; a kind which appears as though it were cracked all over; one in which the colors show only when the vessel is filled with liquid; and still another variety, in which various figures appear raised upon pure white porcelain, and yet the surface is perfectly smooth. The great durability of Chinese ware is shown by the porcelain tower at Nanking, which is nearly three hundred feet high, and entirely covered with porcelain tiles; and which, though it has now stood four hundred years, appears not to have suffered in the least from the action of the air and weather.

The first attempt to make china in Europe is supposed to have been made by the Moors in Spain; then a large manufactory was established in the Balearic Isles, which ware was called *Majolica*, from Majorca, the largest of those isles. This manufacture was afterward removed to Italy where many improvements took place; but these articles were all made of coarse, brownish paste, the imperfections of which were hid by an opaque glaze, instead of the material being perfectly white and the glaze transparent, as is the case with good foreign and modern European ware. This Majolica ware was the most esteemed from the middle of the 14th to the middle of the 16th centuries, when came the epoch of Bernard Palissy in France. His long enduring patience under trials and disappointments of every description, till he almost ruined himsel. in his attempts to discover a new and more perfect enamel glaze, in which he was finally successful, have almost passed into a proverb. Palissy was a Protestant, and died in the Bastile, where he was imprisoned for publicly advocating his opinions.

During all this time only a rough and common earthenware was made in England; but about the latter part of the 17th century began that improvement which has led to the production of our common household china. First it was discovered that salt thrown on the articles heated in the furnace covered them with a rough glaze; then two German brothers of the name of Ellers settled in Staffordshire and discovered there a bed of very superior clay; and after this a gentleman named Astbury, who was engaged in the manufacture, having occasion to employ some calcined flints as a poultice for his horse's eyes, noticed their fine white opaque substance, and added them to the paste of which he made his china, thus supplying the last needed ingredient for the perfection of the art. The next and greatest improver was Josiah Wedgewood, who was born a poor potter's son, but who raised himself to wealth and eminence by his genius and industry; he devoted himself quite as much to improving the style and ornamentation of his works as to their material, and entirely altered the character of the manufacture.

Meanwhile on the continent a similar progress was being made; after many unsuccessful efforts, about the commencement of the 18th century, a German alchymist, named Botticher, made some crucibles which the fire converted into true porcelain; and afterward discovering a fine white clay, of which some had been sold and used as hair powder, he established a manufactory at Dresden; this was followed by several in France, among the rest by the far-famed works of Sêvres, the earlier wares of which factory were actually made entirely of artificial compost, without any of the real ingredients of china represented by the Chinese *kao-lin* and *pe-tun-tse.*

NARCOTICS.—Tobacco is the leaf of various species of *nicotiana*, a plant which is a native of tropical America, but which grows readily in many climates. It has been introduced into almost every part of the globe; and it is thought by many to have been indigenous in China and central Asia as well as in the new world.

Columbus found the Indian chiefs in the habit of smoking cigars when he first discovered the West India Isles; tobacco was brought to France in 1560; and to England in 1586, by Sir Francis Drake and Sir Walter Raleigh. At first the use of it was very much discouraged, and James the First published a "Counterblast to Tobacco;" but opposition only increased the desire to try the novelty, and caused it to spread more rapidly. It is related of Sir Walter Raleigh that when he returned to England, and indulged himself in smoking, which he had learned to like while in America, his servant came in one day, and seeing smoke issuing from his master's mouth, thought he was on fire, ran to give the alarm, and to seek water with which to extinguish the flames, which he momentarily expected to see follow the smoke. The fashionable pipes in his days were of silver, while those who could ot afford so expensive an article used a walnut-shell with a reed inserted.

Tobacco is a soothing narcotic, producing poisonous effects when indulged in to excess, but otherwise only a dreamy unconsciousness to care and trouble. All nations, whether barbarous or civilized, appear to possess the craving for narcotics; and the plants which have been found to yield them are singularly various.

The other narcotics much in use are opium, hemp, and the betel-nut, among the Eastern Asiatics; the coca-leaf and thorn-apple in South America; and the amantia, or narcotic fungus, in Siberia: besides these, the common hop possesses narcotic properties.

Opium is the juice of the seed-vessels of the white poppy, *papaver somniferum*, obtained by making incisions in the seed-vessel before it is quite ripe, when the juice exudes, and is daily collected. The practice of eating and smoking opium is very frequent in the East, the narcotic intoxication it produces being of the most exquisite kind; but the after-effects of excess are proportionably horrible, destroying all power and energy both of body and mind. It is grown principally in India, where at least three hundred thousand acres are devoted to its culture. The Chinese are the largest consumers, importing not less than from four to five millions of pounds' weight annually, at a market value of about twenty-five millions of dollars.

Laudanum and morphia, both of which are used as stillers of pain and sleep-producers, are only other forms of opium. Many cordials too are prepared from it, which are given to infants to quiet them, but produce the most baneful effects, often ending in death.

The hemp which is used as a narcotic is the same plant—*cannabis sativa* or *Indica*—which produces the hemp fiber; it yields in hot climates a resinous extract, which is violently exhilarating and exciting in its effects—so much so that the word *assassin* is said to be derived from the furious conduct of the Haschiseens, as those who use the haschisch, or hemp-resin, are called.

The Betel-Nut grows on all the higher grounds in India, the valleys of the Himalayas, in Ceylon, the Sunda Isles, and the Philippines. This nut, which is about the size of a cherry, slightly pear-shaped and very hard, not much unlike a bad nutmeg, is the seed of one of the most graceful of the palm tribe, the *areca catechu*. It is chewed; the buyos, or betel-rolls, are made by the females of the household. The nut is cut into strips, and rolled up in a leaf of the betel pepper, *chavica betle*, which is dusted on the inner side with quick-lime, made from burnt shells. These buyos, or the materials for making them, are the chief luxury and delight of the natives, who take them about with them in little caskets; and, if they can afford it, are seldom without one in their mouths. It is the employment of the women and girls to make these buyos, and they may be seen in groups reclining in the shade and filling the little caskets belonging to their fathers, husbands, or brothers; these caskets are often of the most exquisite workmanship, being more highly valued than any other similar possession. The quantity of betel consumed is enormous, as may readily be believed when it is known that the betel-nut is chewed by not less than fifty millions of men!

The Erythroxylon Coca, grows wild in the tropical valleys of the Andes, in Bolivia, and Peru; but the coca which is used is chiefly the produce of cultivated plants. The shrub resembles a blackthorn with its small white flowers and bright green leaves. The leaves are gathered when quite mature and dried in the sun, during which operation they smell like newly mown hay. The dried leaves are chewed with quick-lime, or the ashes of some kinds of roots, in the same manner as the betel, and to the dwellers on the Andes they form as much an article of necessity as of luxury. Furnished with his coca pouch the South Americau Indian can perform the most fatiguing journeys and the most laborious tasks with but little rest and food.

The Thorn-Apple, or Datura, of which two species are used, the *sanguinea* and the *stramonium*, seems to possess the most remarkable narcotic property in every part. The intoxication produced by its use gives rise to spectral illusions of the most wild and extravagant kind; which has occasioned the belief among the Indians of South America, that under its influence they are permitted to hold communion with the spirits of their ancestors. In Europe the *datura stramonium* is often smoked as a remedy for the asthma.

MEDICINES, etc.—Camomile Flowers are the dried blossoms of the *anthemis nobilis*, a plant found in dried pastures. The cultivated plant is however preferred; the flowers are gathered before they are fully blown and are dried for use. From their tonic properties they were formerly much used in fevers, and they have been quaintly termed the *cinchona* of the ancients. Medical men derive many of their most useful medicines from plants. In some cases it is the bark of a tree; in others a root, a gum, or an oil; whilst in others the whole plant is made into an extract, or otherwise so treated that its medicinal virtue is drawn out in a concentrated form. Many other plants besides the camomile afford useful medicines.

There is the *tussilago farfara*, or common coltsfoot, a plant so often seen by the side of our railways, where the soil is clayey. This plant is one of those whose flowers appear first, and are succeeded by leaves, when the season is more advanced. These leaves, which are large and thick, are boiled down until a strong decoction is obtained. Another is the *conium maculatum*, or hemlock, the plant with which Socrates was required by his ungrateful countrymen to commit suicide. It is an umbelliferous plant resembling sheep's parsley, but distinguished from it by its spotted stem, from which the specific name is derived; it is abundant in many parts of the country. The next plant we mention is one of a very different growth, the *hyoscyamus niger*, or black henbane; it has a deeply cut leaf, soft, hairy, and of a bluish green color; the flowers, which are pale buff, grow in spikes, they have a dark eye, and are beautifully penciled with dark veins—the scent of the plant is strong and disagreeable. Hemlock and henbane plants are chopped, crushed, and boiled down into extracts of narcotic property.

Deadly nightshade is also a narcotic, and a violent poison, as many poor children, when they have eaten its berries, supposing them to be some pleasant wild fruit, have died; its name is *atropa belladonna;* it is a shrubby plant from two to three feet in height; its leaves are a dull green, and it has a bell-shaped flower of a dusky purple hue, and bears a berry which is black when ripe; the plant is prepared for use in the same manner as the two last mentioned. In addition to the foregoing the common lettuce, and a poisonous species, the *lactuca virosa*, are also in some degree narcotic.

The root of the common *dandelion*, *leontodon taraxacum*, yields a medicinal extract; this plant is allied to the chiccory with which coffee is adulterated. Liquorice is also used as a drug, but may be more properly classed with sweetmeats; it is an extract prepared from the roots of the *glycyrrhiza glabra*, a leguminous or pod-bearing plant resembling the lucerne with which horses are fed.

Liquorice.—Small pieces of the root are planted very deeply in rows in a rich light soil; at the end of three years the roots are fit for use: liquorice is grown extensively near Pontefract, and close to its ancient and ruined castle, whose portcullis is still stamped on that preparation of it known as "Pomfret cakes." It is largely imported from Spain.

Poppies are cultivated for the sake of the ripe seed-vessel, which, as well as every other part of the plant, excepting the seed, is narcotic. The species so used is the *papaver somniferum*, already described as yielding opium in foreign countries. It has beautiful white petals tinged with purple at their base, and is said to be a native of Asia, but was early introduced into Greece, probably for the sake of the seed, which was used as food, and which yields an oil when pressed. The petals of the common scarlet poppy are collected for the sake of the coloring matter they yield. They also are slightly narcotic, and are used for making a syrup.

A Kind of Cucumber grown in England for druggists, the *momordica elaterium*, a native of the south of Europe, is a perennial plant with trailing stems, bluish green in color, and bears a fruit like a very small cucumber, only rough and hairy; when ripe, this falls off, and from the hole left at the foot-stalk the juice and seeds are projected to a considerable distance; this property has given rise to its English name, the squirting cucumber, and appears to be a contrivance for its self-preservation. Its seeds and juice are used when nearly ripe; there is a green sediment thrown down after standing, and this when dried is a powerful medicine.

Saffron is the dried stigma and part of the style of the *crocus sativus*, a beautiful lilac crocus, found growing wild in England, but supposed not to be indigenous to that country. It is largely grown in Essex and Cambridgeshire. Saffron is also brought from Sicily, France and Spain; the English is, however, the best.

The flowers are gathered early in the morning, just as they are about to open; they are then spread on a table, and the requisite part taken out. A mass of these stigmata, some inches in thickness, is placed on sheets of paper, over a hair sieve; other sheets of paper and weights are placed on the top, and the whole is roasted over a small kiln; this produces a cake of saffron, but that which is not so prepared, but merely dried in the sun, is the finest, and is called *hay* saffron. The beautiful meadow saffron, *colchicum autumnale*, which adorns our gardens in the latter part of the summer, is an indigenous plant, and is also used in medicine; the parts employed for this purpose are its bulb, sliced and dried, and the seeds.

Aloes is the inspissated or dried juice of the plant of that name growing in the East Indies, Socotra, Cape of Good Hope, Barbadoes, and Arabia. It is of an intensely bitter taste, and is a very useful medicine. There is another article, called aloes-wood, which is not to be confounded with the drug just mentioned; but is, in all probability, the aloes mentioned in the Psalms, in connection with myrrh and cassia; from which, as well as from its being used by Nicodemus for embalming the body of Christ, we may conclude that it had aromatic properties.

Aloes-Wood is the produce of a large forest tree growing in eastern and tropical countries, and appears to be the result of a diseased action on some of the branches. The wood of such trees as are thus diseased is wholly valueless. It is in high repute for fumigations, and as incense in all Hindoo, Mohammedan, and Roman Catholic countries.

Bark is a powerful tonic medicine, first made known to Europeans in 1632 by the Jesuits, who found it in South America. The tree which is said to afford this bark is found on the mountains of Loxa, in the kingdom of Quito; and on those of Santa Fé de Bogota; growing along their skirts, and on the plains under the fourth degree of north latitude, flowering from May to September. It is a spreading tree, rising from fifteen to twenty feet high, with a single erect round stem of no great thickness; and covered with a smooth bark, externally of a brownish gray color. The leaves of this tree are of a beautiful deep red color in spring, so that the valuable trees are easily discovered. It was first called Jesuit's bark, because they brought it over to Europe, then Peruvian bark, and now cinchona bark. Quinine, in which form it is extensively used, is the active principle of this bark, combined with sulphuric acid; which is also, in itself, a powerful tonic.

Rhubarb is the root of the *rheum* or rhubarb plant; several species are supposed to furnish the drug, and it is not accurately known from which of them each variety is derived; it is brought to this country under the names of Russian, Turkey, and Chinese rhubarb. All that is called by the first two names is reported to grow on the declivities of a chain of mountains in Tartary, extending from the Chinese town of Si-ning to the lake Ko-ko Nor, near Thibet. The soil is light and sandy, and the rhubarb is said to grow best in the shade and on the southern side of the range.

In Tartary, the roots are taken up twice in the year, in spring and autumn, the body of the root is divided transversely into pieces of moderate size, which are dried for several days; a hole is then bored through each piece, by which it is hung up to finish drying. Part of this rhubarb is conveyed through Natolia to Turkey, and thence obtains the name of Turkey rhubarb, the rest goes to Russia, and is named after that country. In China the roots are not dug up till winter, and after being cut into slices are dried on stone slabs with a fire underneath them, and afterward hung up and exposed to the greatest heat of the sun.

Senna is produced from various species of cassia; they are annual plants, natives of Upper Egypt, Central Africa, and India. The best kind of senna is the dried leaf of the *cassia cautifolia*, some of which is called Tripoli senna. This species grows about two feet high, and bears a yellow flower; the seed is contained in a legume.

Ipecacuanha is the root of a creeping perennial plant, the *cephaëlis ipecacuanha*, which grows in moist, shady places in the forests of Brazil and various other parts of the South American continent. It is a very valuable medicine, and has probably been used as such in its native country from time immemorial, but it was first brought to Europe about the time of Louis XIV., by a French merchant. Its name is said to be derived from *epi*, the Indian word for root, and *cacuanha*, the place where it grew most abundantly.

Sarsaparilla.—This also is the root of a plant, *smilax sarsaparilla*; and there are several other species which possess the medicinal quality —*officinalis*, *medica*, etc. It grows in America and the West Indies: it is exported in bales, and looks like bundles of long, slender twigs, covered with a brown or reddish wrinkled bark; it is in this bark that the medicinal quality resides. It is usually taken in the form of a decoction. The prepared sarsaparilla which you have seen in bottles, looking almost like treacle, is a very strong decoction of the drug, boiled down with various other things.

Camphor is a white crystalline substance, not exactly brittle, though it crumbles easily; it has a strong refreshing smell, and warm, acrid taste; it is so light as to swim on water; it burns readily with a bright white flame; so extremely volatile is it, that it entirely evaporates if left exposed to the air, and no trace remains of its having been there. This property gave rise to an amusing incident in a chemist's shop, where a little boy came in and said his mother sent him for "two-pen'orth of nothing;" he could give no clearer account of what was wanted, and, after thinking, the chemist's assistant sent camphor, which answered the description more nearly than any thing else, as it would be nothing in due time if left alone, and it proved to be the article intended!

Camphor is the result of evaporating an essential oil found in two different trees, the *cinnamomum camphora*, which grows in China and Japan, and the *dipterocarpus camphora*, of Sumatra and Borneo; from these two trees it is obtained in very different manners. In the *cinnamomum* it exists in root and branch, stems and leaves, and consequently these are chopped small and put into earthen vessels, which are heated; these vessels are covered with hoods, and rice straw is placed in them; the camphor is volatilized, and rises; it condenses on the straw, from which it is afterward cleared. It exists in the trunk of the other tree, the *dipterocarpus*, in a solid form, and is obtained by cutting the tree down and splitting it open—it is found in pieces from one to two feet long, and about as thick as a man's arm; and a moderate-sized tree will yield about ten pounds of camphor; a large one perhaps twice that quantity. This kind is much more highly esteemed than the other, so that in Japan two hundred pounds of native camphor are valued at one pound of the Bornean.

Iodine.—This useful medicine, which is a deadly poison, is a peculiar mineral substance, existing in sea-water, sea-weeds, sponges, and many marine productions, as also in many mineral waters. It is obtained by digesting sponge or sea-weed in water, and crystallizing the liquid, then mixing it with sulphuric acid and black oxide of manganese, and distilling the compound; the iodine rises in beautiful violet-colored vapor, which condenses into brilliant blackish scales. Its name is derived from the Greek, and signifies a *violet color.*

Castor-Oil is the produce of the seed of the *ricinus communis*, or *palma-christi*, a tree which sometimes attains the height of thirty feet, and in cold climates becomes an annual plant; it grows in Greece, the East and West Indies, South America, and Africa; also on the rock of Gibraltar. The seed is inclosed in a rough spiny nut; this bursts when ripe, and expels its three seeds. The oil was formerly procured by boiling them in water, but is now obtained by pressure: they yield by this operation one-fourth of their weight in oil.

Croton Oil, which is an extremely powerful oil, expressed from the seeds of the *croton tiglium*, a native of the Molucca Isles and the Indian peninsula, is also used as a medicine. It has a woody stem, and a soft, blackish bark; the seeds are oblong, and about the size of a coffee bean. The oil, when rubbed on the skin, is extremely irritating, and has a somewhat similar effect to a blister.

Blisters owe their irritating qualities to a kind of fly. This insect, the *cantharis vesicatoria*, is common on various kinds of trees in Spain, Italy, and the South of France, and, indeed, to some extent all over Europe. Those used in this country are chiefly brought from Astrachan, and possess the irritating quality in a high degree. The insect is about two-thirds of an inch in length, and of a green and gold shining color, with long flexible wing-sheaths covering brown transparent wings. Cantharides are procured by smoking brimstone under the trees on which they are found, and then catching them on a cloth underneath; or they are simply shaken off, killed by the steam of boiling vinegar, and afterward dried.

Gum, or Gum-Arabic, as it is called, is a clear sticky substance, which exudes from one or two species of acacia growing in Arabia, also in Senegal, and some other parts of North Africa. The trees have a hard, withered aspect, with crooked stems and branches; the secretion of gum appears to be the effect of disease, as the greatest quantity is obtained from the sickliest trees, and during the hottest summers. It is quite liquid when it first exudes, but hardens by exposure to the air, and this without losing its transparency. It is gathered in July or August, when the weather is hot and parching. When stowed away, it has a faint smell; it is also heard to crack spontaneously for many weeks after it is gathered. Gum is useful in medicine, as well as the arts, and its adhesive quality and ready use have made it almost one of the necessaries

MISCELLANEOUS.

Sealing-Wax is a compound of shell-lac and resin, and is colored with vermillion, lampblack, or verditer, according to the hue desired; these ingredients are melted together, and the sealing-wax is afterward formed into sticks by rolling.

Lac is a resinous substance produced by a little insect, the *chermes lucca*, on the leaves and branches of certain trees growing in Bengal, Assam, Pegu, and Siam. This little creature lays its eggs on the bark, and then covers them with a quantity of lac, which is evidently intended to protect them in their early stages, and to feed the young larvæ when they come out. It is beautifully formed into cells, with much care and regularity. Lac yields a fine red dye, inferior in color to cochineal, but said to be even more permanent.

There are several different kinds of lac, or, at least, different states in which it is brought to market: first, there is a stick-lac, which may be called its natural state, nothing more being done to it than breaking off the incrusted twigs and bringing them to market; seed-lac is the pounded stick-lac after it has been separated from the sticks, and all the coloring matter extracted from it, which makes lac-dye or lake. Shell-lac is produced from seed-lac, by melting it and straining through a bag; it thus forms thin, transparent, amber-colored plates, and is used for making sealing-wax, and for varnish also, in making hats.

Cochineal is a brilliant red dye, obtained from certain small insects which abound in the tropical parts of America; being found wild in Mexico, Georgia, South Carolina, and some of the West India Islands, feeding on the common Indian fig, or prickly pear, *cactus opuntia;* in Mexico, and some of the adjoining Spanish settlements; the insect is reared with great care on the *cactus cochinilifer*, on which it grows much larger than in its wild state, though seldom exceeding a barley-corn in size. The female insect alone is gathered, as it alone yields the dye; it is wingless, and very stationary, seldom moving from the part of the plant where it has fixed itself. It spins a little web, lays its eggs, and dies. The male has wings. It may seem strange to speak of a crop of insects; but the growers of cochineal treat it like a crop, and make a very profitable trade of it: their first care is to rear the plantation of prickly pears; and, when this is ready, pieces of a plant infested by the cochineals are placed here and there among the others; they soon spread and in time the plants are all covered.

The wild cochineals are gathered six times a year, just before they lay their eggs, but the cultivated only three times. The insects are detached from the plant by means of blunt knives, and are put into bags and dipped into boiling water to kill them; they are afterward dried in the sun, and though they lose two-thirds of their weight by this process, yet 600,000 lbs. are annually exported to Europe.

Cochineals look like small oval grains, flat underneath, dark and dusted over with a white powder; when crushed, they form a rich dark-red powder, and from them all our most beautiful scarlet and crimson dyes are procured.

The Kermes is an insect of the same species as the cochineal, found upon the evergreen oak; which was much used before the discovery of America, for dyeing scarlet; its name is of Persian origin, and the Moors appear to have been well acquainted with its use, both before and after their settlement in Spain. Since the introduction of cochineal it has been little used, as the dye it yields is much darker and less brilliant, though it stands better. The scarlet wools dyed with kermes, in some old tapestries in existence at Brussels, retain all the brilliancy of their color, though they are two hundred years old.

The Logwood-Tree, *hœmatoxylon Campechianum*, grows in Campeachy, and some other parts of South America and the West India Islands. It is a small tree, seldom more than twenty-four feet high, very crooked in its growth, branching and bushy, and the smaller branches beset with strong spines; it has pinnate leaves and terminal clusters of reddish yellow flowers. Another red or pink dye is obtained from the flowers of the dyers' carthamus, *carthamus tinctorius*, also called safflower; this is an annual plant, growing in Egypt; it has a stout stem, with many pointed leaves full of strong veins, and a flower not much unlike a rich orange or golden-colored thistle, though it is not the same order of plants as the thistle.

Madder is the root of a plant cultivated in many parts of France and in Zealand; that which comes from the Levant is thought superior to any other, and the difference is attributed to the roots of this kind being dried in the open air, under so clear a sky. The beautiful bright red, called Turkey red, is also dyed with madder, the different colors being the result of different mordants which are used. The Latin name of the madder is *rubia tinctorium.*

Indigo is a deep-blue dye, obtained by steeping the leaves of a small leguminous shrub, the *indigofera tinctoria*, in water; a blue sediment is deposited, which is afterward evaporated to dryness. This dye has been used in India for many ages, but was not known in Europe till the middle ages. One species grows wild in the temperate parts of Asia, and another in tropical America and in central Africa. The greater part of that now used is, however, the result of cultivation.

Isinglass is a kind of very fine pure glue, made of the air bladders and sounds of various large fishes. The best is that brought from Russia, where a great quantity is made from the fish taken in the various large rivers which flow into the North Sea and the Caspian. Isinglass dissolves readily in boiling water, and is used to make jellies, *blancmange*, and many other pleasant articles of cookery; it is often used to stiffen silk, to make sticking-plaster, and for various other purposes. A less expensive article of a similar kind, called *gelatine*, has been introduced of later years, but it is not nearly so good as isinglass.

Musk is a singular and highly-scented article, obtained from a secretion of the musk deer; a small animal which inhabits the Alpine regions of the Himalayas and other mountains in the east of Asia. The scent of musk is the most powerful and durable that can be imagined; a cork which had stopped a phial containing musk, but which did not touch it, has been known to retain its scent twenty years after being removed; and drawers once scented with musk, scent every thing put into them for years after.

Sponge is a marine substance of the same class as coral, being in fact the dwelling-place, or rather skeleton of a whole colony of polypes; for these strange little creatures carry the principle of having all things in common so far, that they actually have one household skeleton, on which their separate, tiny, pulpy selves exist, and which they all help to form. In their first stages of existence, sponges are little gelatinous bags, apparently possessing the power of swimming; they finally fix themselves on a rock, their skeletons begin to be formed from some internal secretion of their own; and then they never move again, but grow and grow till the mass is like the sponges we see; only it is always covered with the jelly-like living covering, furnished with pores or mouths which suck in the sea-water for nutriment, and larger holes through which it is expelled.

There are a very great number of different sponges, and some variety is found on almost every shore, but those we use for washing are chiefly brought from the Mediterranean Sea, and the Archipelago; these sponges are obtained, some by dredging and some by diving; the latter mode is rendered more easy than it otherwise would be, by the exquisite transparency of the water, which enables the diver to discern his desired object growing at the bottom of the sea.

Indian Rubber, or, as it is sometimes called, *caoutchouc*, is the dried juice of several Asiatic and American trees. That which comes from Asia is mostly derived from the *ficus elasticus*, a large and handsome tree of the fig genus, which towers above the surrounding forest, growing either solitary or in groups of two or three. One trunk which was measured, was found to be seventy-four feet in circumference, and they sometimes attain the height of upward of one hundred feet. It is calculated that, in a belt of forest thirty miles long and eight wide, which exists in one part of Assam, there are more than forty-three thousand of these trees. The South American caoutchouc is the produce of the *jatropha elastica*, and the *siphonia elastica*.

In the cooler part of the year the bark is cut through, when a white milky juice exudes, which in South America is generally applied at once to the outside of clay moulds and dried. After repeated layers have been applied, when quite a thick substance is produced, the mould is crushed, and the fragments are removed through the neck of the flask formed; as this drying process is often performed in the smoke, the juice by this means becomes black. From the East Indies it is imported in lumps or balls, and sometimes the juice itself is brought over in close-stopped vessels.

It was first used for rubbing out pencil-marks on paper. It is extremely elastic, so much so, that a small Indian rubber bottle, only a few inches in diameter, can, after being softened in warm water, be inflated with air till it is six or seven feet in diameter, and semi-transparent. This quality makes it very useful for forming bands and straps, and for weaving into a kind of cotton web, which is used for similar purposes; children's playing-balls are also made of small globes of Indian rubber inflated with air. This brings us to another of the useful qualities of this curious substance; it is perfectly insoluble in water and impervious to both water and air, hence its use in making waterproof fabrics and air-pillows; these are generally made by spreading a thin coating of caoutchouc, dissolved in spirit, between two surfaces of the cloth, which by this means are firmly glued together, and made perfectly waterproof. The uses to which Indian rubber and its congener, gutta percha, a more recently discovered and more solid article are applied, are too numerous to mention; tubes, pipes, straps for machinery, trays, picture-frames, ink-bottles, whips, sticks, combs, boxes, chairs, tables, sofas, and all sorts of furniture are formed of it.

Gutta Percha is another substance similar to Indian rubber, being the dried sap of the *isonandra gutta*, a tree growing in Malacca, Singapore, and some other eastern places. Gutta percha was first brought to England in 1845; it is now imported in immense quantities.

The Diamond is a gem or precious stone; pure, clear, and white, so brilliantly reflecting the light, that it shines and sparkles in an almost dark room. It is the hardest substance known, and can only be cut, shaped, and polished by means of its own dust, which is also the best material for polishing all hard, impracticable stones.

They were formerly brought from the celebrated mine or mines of Golconda, in India, but these are said to be nearly exhausted. Some of the larger islands of the Indian Archipelago have yielded valuable diamonds, but the greater number now brought to Europe come from the Brazils, in South America. These gems are frequently found in beds of torrents, by which they have been dislodged and conveyed away. Diamonds are generally small, and are hence considered of value in proportion to their *size*, as well as their clearness; some very large ones being reputed to be worth incredible sums of money. The largest and most valuable diamond now known is the Koh-i-noor, or Mountain of Light, belonging to the Queen of England; it came from India, having formerly belonged to Runjeet Singh. It was exhibited at the great exhibition in 1851.

Diamonds are not found all bright and glittering, but they are covered over with a thin crust, which, however, is readily removed; they are then found to be octahedral crystals.

The white diamonds are the most valuable; but there are others which are much admired, these are rose-colored, blue, or even black; light-colored ones, and those which are even in the least degree deficient in transparency, are of less value. This gives rise to the terms used in speaking of the quality of these stones, the finest are called diamonds "of the first water," while inferior ones are said to be of the second water or the third water.

Rose diamonds refer to the shape into which they are cut. A rose diamond has one side flat, and the other raised, and cut into a number of flat faces, called facets; a brilliant is much thicker in proportion, and has both sides raised. The diamond is most nearly allied to coal—black, dull, opaque coal, which is the nearest relation the diamond has in the mineral kingdom. The learned have discovered that the diamond consists of pure carbon, and charcoal is pure carbon also; the only known difference being that one is crystallized and the other not.

The names of some other gems are the emerald, ruby, turquoise, amethyst, topaz, garnet, onyx, sapphire, opal; and agate, jasper and cornelian, though they do not rank among gems, are often used for ornament.

The finest Emeralds come from Peru, and other parts of South America, though they are sometimes brought from the. East. They are of a beautiful clear green color, some very dark, others paler, and are much valued and used for ornamental jewelry; the queen of Spain's emeralds were among the most beautiful jewels shown at the Great Exhibition. Rubies are very striking gems, being, when of the finest sort, of a beautiful dark-red color, and very clear; they are not, however, often of large size, and are not so hard as many other gems, the emerald for instance. There is an inferior kind, of a pale rose-color, which are brought from Balachan in Tartary.

The Sapphire is generally called a blue gem, and that is the color intended when people talk of a "sapphire hue," but it varies so very much in color that there are sapphires which resemble and, as it were, counterfeit other gems; these are called oriental emeralds, topazes, or whatever other stone they resemble. The red sapphire, or oriental ruby, is one of the most valuable gems, coming next after the diamond. Some sapphires present when polished a beautiful effect from a six-rayed star of light gleaming in their center. This is the effect of the six-sided form of the crystal.

The Opal is only partially clear, and its great beauty consists in the play of colors from its interior; yellow, red and green, the most exquisite tints, flash and gleam from it as it is moved about. The finest opals are as valuable as diamonds; they are brought from Turkey, and sometimes from Hungary, but it is seldom that any are found of large size.

The Amethyst is a clear, hard stone, of a beautiful violet color by daylight, but looking brown by candle-light; it is nearly related to the quartz rock-crystal, which is used for making spectacle glasses, and sometimes for false diamonds. We get the finest amethysts from Ceylon, the Brazils, and the southern part of Spain. The turquoise is an opaque stone of a blue color; it is very soft in comparison with most gems, and is therefore often used for engraving upon; it is very easily imitated, and consequently a large proportion of cheap jewelry pretends to be adorned with turquoises.

The Topaz is of a bright golden yellow, the garnet of a good deep red; the latter is not very valuable, though very pretty. In some places small garnets are crushed, to use instead of emery; and in Germany, where garnets are very abundant, they are sometimes used as a flux for iron ore. The topaz is found in several parts of the East Indies, in Ethiopia, Arabia, Peru, and Bohemia; the oriental are the most esteemed. They can easily be imitated.

The Onyx, the Agate, the Cornelian, the Sard, and Sardonyx, are only differently marked and colored varieties of one stone, which is called *chalcedony*. This stone in its pure state is colorless, or only tinted bluish gray, but other matters are sometimes present in it, and then it varies in color; the sard is deep red brown; the sardonyx, layers of brown and white chalcedony; cornelian is usually either red or white, and always clear; the agate is found in various colors, and has many markings, sometimes angular or zigzag, in which case it is called a fortification agate; sometimes straight lines of color give it a banded appearance, it is then called ribbon agate; another kind has markings quite different, and is called a moss agate. The onyx has layers of different colors, and advantage has been taken of this for cutting it into beautiful ornaments. A head or group of figures is carved by the artist from the white layer of stone, leaving the background dark, or else the figures stand up dark and clear, relieved by the snowy background. Gems cut in this manner are called cameos.

The Greeks and Romans possessed the art, and many specimens remain of their work, which will never be surpassed in beauty, and which are now valued at enormous sums. Glass imitations of these antiques are now not unfrequent, and are often such beautifully exact copies, both in outline and color, that no one can distinguish the difference between them. Cameos are also made from the lip of the helmet shell, a large thick shell which is formed of layers varying in color like the onyx.

Pearls are generally considered jewels; they belong to the animal, and not to the mineral kingdom. These are round bodies, white and shining, with a peculiar and beautiful luster, for which we have no other adjective than *pearly*. They are supposed to be the effect of disease in the fish inside whose shells they are found, as they are not by any means found in all the shells. Various shell-fish yield pearls, but the finest, and by far the most frequent, are those produced by a peculiar kind of oyster, called from this circumstance, the pearl oyster. The most abundant fisheries are near Ormuz in the Persian Gulf, and on the coasts of Ceylon, though they are obtained in many other parts of the East, and indeed of the world. Expert divers go out in pairs or threes in boats or rafts to the fishing ground, and then they cast anchor, and one of the party having fastened to his body a heavy stone to serve as ballast, a net to contain his oysters, and a rope by which to be hauled up again, goes overboard, and sometimes dives to the depth of sixty feet. He immediately commences gathering the oysters, which often adhere firmly to the rocks; when his net is full, or he can no longer hold his breath, he pulls the rope, and his comrades above haul him up again; sometimes, alas, this is not done in sufficient time to save him from the sharks and other voracious creatures which haunt these pearl beds, and he loses life or limb in his perilous undertaking! When the oysters are taken on shore they are heaped into shallow pits, and covered with sand; they soon open and die, the fish rots away, and the pearls fall out. They are then cleansed and sifted, and are valued according to their size; large round or perfectly pear-shaped pearls are the most highly esteemed, and they should be quite white, not tinged with any other hue.

Artificial pearls are made by spreading a silvery substance, obtained from the scales of the *bleak*, a small fish, inside hollow glass beads, and then filling them with white wax.

Asbestos is a curious mineral, which consists of long silvery fibers; there are four or five varieties of it, named after their different appearances. It possesses the remarkable property of being almost indestructible by fire, and on this account was highly prized by the nations of antiquity, who spun it and wove it into cloth, of which they used to form shrouds, in which the bodies of royal and illustrious persons were arrayed at the funeral pyre; as the asbestos cloth did not consume, the ashes of the departed were thus kept from mingling with those of the wood, etc. It is said that the Brahmins sometimes made themselves clothes of it, and also employed it for wicks to their perpetual lamps, etc. In Europe, at the present day, asbestos cloth is considered more as a curiosity than in any other light, but a new use has been found for this curious mineral; the fibers of it, which appear to burn without being consumed, are employed to fill a newly invented kind of gas stove, the numerous jets of which supply the blaze and heat the asbestos red-hot.

Asbestos is found in the silver mines in Saxony, also in Sweden, Corsica, and many other parts of Europe, as well as in America.

Talc is a whitish-gray mineral, found in rocks of serpentine, mica schist, and gneiss. It is readily split into plates, which are flexible, transparent, and not elastic. It will bear great heat, and is used for stove windows, where glass would crack.

Emery is a mineral of a blackish-gray color, chiefly brought to this country from Naxos, an island in the Archipelago, but found also in Germany, Italy, and Spain. It is reduced to a fine powder by trituration, and is much used in polishing glass, metals, and other hard bodies.

Pumice-Stone is a kind of light, spongy, vitreous stone, which looks as though formed of glistering threads slightly united. It is found in the vicinity of volcanoes. The Island of Lipari, in the Mediterranean, is said to be the chief source from which Europe is supplied with this useful article, the whole body of the island appearing to be formed of it. There are several different kinds of pumice-stone, but those only are imported which are light and spongy. Pumice-stone is used for polishing metals and marble, for smoothing the surface of wood and pasteboard. House-painters use it for rubbing off old paint before they apply the fresh coat.

Fullers' Earth is a kind of clay, which is employed to take the grease out of wool and woolen fabrics before the application of soap. It is opaque, soft and greasy to the touch, and falls to powder on being put into cold water. Its remarkable detersive quality is derived from the alumina which it contains, sometimes to the amount of one fourth or one fifth of the whole. The best fullers' earth is found in Buckinghamshire and Surrey.

Alum is a white, semi-transparent substance, much used in the arts, especially in dyeing; for it acts the part of a mordant, fixing or brightening many colors which would otherwise be fugitive or very dull. It is astringent, and has a sharp acrid taste; it is soluble in water. Alum is a compound substance, consisting of aluminium, or pure clay, potass, and sulphuric acid. It is sometimes found native, but by far the larger proportion of that which we use is manufactured. The best alum is that which comes from Civita Vecchia, in the Roman States; it is in irregularly crystallized masses, about the size of a walnut. Rock, or as it should be written roche-alum, is of a pinkish hue; it comes from

Smyrna; it was formerly made at Roccha, in Syria, whence its name. English alum, for the manufacture of which there are several works in the north of England, is esteemed the least valuable kind.

Loadstone is a mineral substance, and it is one to the discovery of which, and its application by science to the purposes of common life, we are indebted for perhaps more of our comfort and safety, more advance in civilization, than to any other mineral, unless perhaps we except iron; and even iron need not be excepted, as loadstone is clearly proved to be an ore of iron. This curious substance, which is of a dark color, rough and unattractive in external appearance, has the property of drawing to its surface any piece of iron or steel with which it may come in contact, and holding them fast as by some invisible power. It can also impart this attractive force, which we call *magnetism*, to iron or steel, so that they also in their turn can attract other pieces. The property in which the chief value of the loadstone consists, is not, however, this magnetic force, but its power of always turning toward the pole, so that by its aid the sailor on the trackless sea, the wanderer over unknown lands, can always discover the direction in which he is traveling.

The mariner's compass—consisting of a small round box, marked with the north and south, and various other points, and a needle of magnetized steel, so balanced that it can turn freely in any direction—is the most useful application of the powers of magnetism. The honor of having discovered this property in magnets, and first using the compass, is attributed to a Neapolitan, named Flavio Giola, who lived in the 13th century, though there are many claimants for this honor, both among the nations of Europe and the East, the Chinese, as usual, being said to have been fully acquainted with its use long before the time of its discovery in Europe. It is well known that the ancient Greeks and Romans were acquainted with the loadstone, and many of its uses, but they do not appear to have discovered its polarity, and consequently all their vessels were afraid to go far out of sight of land, and could only steer their course by observations of the sun and stars. The word magnet is said to be derived from Magnesia, a country in Lydia, where this loadstone or natural magnet was first discovered, and there is the more reason to conclude that this is the case, because it is often called in old manuscripts *lapis Heracleus*, from Heraclea, the capital of Magnesia. The name loadstone is of northern origin, and signifies leading or leader stone.

The magnetic influence is called the *magnetic fluid*, and it is supposed not merely to exist in loadstone, but to pervade every particle of matter to such a degree as to convert the whole earth into one great magnet, and the poles or points to which the fluid is attracted, so nearly coincide with the poles of the earth's axis, that, with a little allowance for the variation of the needle, which modern science enables us to do very accurately, the direction of the north pole may always be taken to be that indicated by the pointer of the magnet. It has been proved, that if little magnets be placed on a much larger one, their north poles are attracted to its north pole, and deflected from it in just the same manner.

It is a curious circumstance that the north pole always attracts the south, and the south always attracts the north, repelling all those of the same name. Thus, with a common steel-bar magnet you may attract a needle or group of steel filings with one end, till they all cluster like a swarm of bees around it, and with the other end you may drive them all away.

Steel is made from iron. Bars of wrought iron are imbedded in pounded charcoal, and exposed to a furnace heat in close vessels; when withdrawn from the furnace, the steel is found to have absorbed some of the charcoal, to be harder and more fusible, and its surface covered with small bubbles; hence it is called *blistered* steel; when several rods of this kind are heated together in a box with a flux, and afterward hammered into one piece, it is called *shear-steel*, because it is the most suitable for making shears, scissors, etc. When this kind of steel is melted and run into ingots, it is termed *cast-steel*, which is the most perfect form of the metal.

In tempering steel, it is plunged, when red-hot, into cold water or oil, by which means it becomes very hard, and can be made brittle and highly elastic; some things, such as a lancet, require the steel to be hard as adamant, but do not need strength, and break immediately; while for others, such as a trowel, the hardness must be associated with a toughness, which shall suffice to prevent its breaking even with the roughest work; these extremes, and all intermediate stages, can be attained by regulating the processes of hardening and tempering. The most wonderful stories are told of the temper of swords and cimitars made at Damascus in the middle ages; and Andrea of Ferrara, who was supposed to possess the secret of the Damascenes, has left his name to blades of matchless temper; these swords would, it is said, curl up, or bend in every possible manner, without breaking; and yet such was their strength and keenness of edge, that not merely muscles and bones but common iron, steel, and brass, were severed by them without difficulty.

Toledo, in New Castile, also obtained great celebrity in this manufacture, the secret of which was probably conveyed by the Moors; nor does the art appear to have died out. Toledo blades were shown in the Great Exhibition in 1851, which would bear, uninjured, insertion into a sheath in the form of a coiled serpent.

These swords were generally ornamented with a variegated pattern of black and gray, or, as it has been called a *damask* on their surfaces; this was produced by welding an iron wire round the piece of steel intended for the blade, and afterward twisting it in various directions; or in some cases grooves were filed and the wire let in, in a pattern, and afterward welded; these patterns were rendered visible by the application of diluted acid.

Needles are made of steel wire, which is reduced to the required fineness by being drawn through successive holes, each smaller than the one before; when fine enough, the wire is cut into lengths, and each piece flattened at one end, in which flat part the eye is punched with a sharp steel die; the corners are next smoothed off, a little groove is filed on each side of the head, the point is filed sharp, and all rough ness removed. The unfinished needles are now laid on a piece of iron, to be heated over a charcoal fire, and thrown while hot into water, to temper and harden them; as this process often renders them crooked, they are obliged to be warmed and hammered straight again, and then require nothing more but polishing. This is done by rolling and rubbing immense numbers of them together, with oil and emery, after which they are well washed in hot water and soap, and dried in hot bran; the points are ground fine, and the needles sorted and packed.

The Spanish Moors are said to have been the inventors of steel needles; before which thorns or fish-bones, with a hole pierced for an eye, or some other contrivance equally clumsy, were generally used, as they are now by the women in the South Seas and some tribes of Indians. The first needles made in London were made by a Moor, in the reign of Henry VIII.; and Stowe tells us that, in Queen Mary's days, steel needles were sold in Cheapside and other busy streets in London. After this time the manufacture increased rapidly, many Germans coming over to England and establishing needle-works in villages in different parts of Warwickshire, and near Sheffield.

Tin is made thus: the iron is rolled out into very thin sheets, and these are made perfectly clean with acid from all rust or dirt; they are then dipped into melted tin, which covers them over with a brilliant and immovable pellicle of that metal.

Tinned articles, besides their cleanliness and durability, have the advantage of being very light. Block tin is the same material, hammered afterward and *planished*, that is, beaten on a metal stake with a polished steel hammer, till it is perfectly smooth and bright. Many small articles, such as nails, bits, and common stirrups are first cast in iron and then tinned.

Tin itself is a white metal, bright and silvery; it is elastic, and consequently sonorous, ductile, very light, and it fuses at a much lower temperature than is necessary to heat it red-hot.

Tin is found in England, in some parts of Germany, and also in the New World, but the largest supply comes from the Malay peninsula and the adjacent islands; this is called Banca tin, from the place of its export.

Tin ores are found in veins or fissures, called locally *lodes;* their direction is mainly from east to west, and they branch out and divide like the boughs of a tree, diminishing till they terminate in mere threads. Tin is also found in a dispersed form in loose stones, which, when found continuously, are called streams. The most common tin ore is very hard and glass-like.

Tin mines are now often carried on at a great expense, which arises from the galleries having to be supported with large timber. The most remarkable mine is one which has long been abandoned on account of its danger; this, the Huel-cok, is carried under the bed of the ocean below low-water mark; and, in one place, where the rich vein ran upward, the improvident miners pursued it till only four feet of rock were left between the mine and the bed of the sea, which could be distinctly heard howling and roaring, the rolling of the masses of rock moved by the waves sounding like repeated peals of thunder. Another mine, called the Huel Ferry, is entirely submarine.

The rock is blasted with gunpowder, and carried to the stamping-mill, where it is pounded small and washed from the mud with which it is mixed. It is next smelted in large furnaces, culm coal being used as a flux: the tin is run from the furnaces into blocks weighing from two to four cwt. each.

Beside the use already mentioned of coating vessels made of other metals, to prevent their rusting, which is the principal one, pure tin is used for making dyers' kettles, which are, consequently, very expensive; and it is made into tinfoil, which is an article of great use. This is made by rolling and hammering tin till it is hardly a thousandth part of an inch in thickness. Tin has also an important place in the art of dyeing; solutions of tin in nitric, muriatic, and sulphuric acids being used to give a degree of permanence and brilliancy to several colors not to be obtained without it.

Copper, when pure, is of a singularly red color, exceedingly malleable and ductile: it can be hammered when red-hot; it is not so hard as iron, but nearly as tenacious; and is remarkable for not corroding by exposure to the air; immense quantities of it are used in this country for coppering the bottoms of ships, for coinage, and for a multitude of household utensils, etc., as well as for making brass.

To obtain the pure copper from the ore, the different ores are well mixed, this being desirable, as one ore often acts as a flux to others: the whole is then calcined, remaining twelve hours in the furnace, from which it is raked out black and powdery. The next process is smelting, during which the slags or earthy parts rise to the surface, and are cleared off, the metal being run out into pits filled with water, which causes it to become granulated. These two processes are repeated twice more, and then the metal is roasted again; which oxidizes the iron and other metals still combined with the copper. Nothing now remains to be done but refining and toughening. The latter is a curious process: the metal in the furnace is covered with charcoal, and a pole of birch-wood is stirred in it; this causes ebullition, and the grain gradually becomes finer, the color a lighter red, and the metal more malleable.

Lead generally occurs in limestone; the process of reducing the ore to pure lead is much the same as that employed for tin: stamping, washing, and smelting; only the lead usually passes out of the miner's hands before the smelting, which is performed by the owners of cupolas or smelting-houses.

The ore supplied to one charge of the furnace should consist of from five to eight different sorts, on which mixture the perfection of the article much depends. This charge is first roasted, to dissipate the sulphur and arsenic contained in the ore, and then fused, in which state it is covered with a stratum of slag or refuse, swimming on the top of it, to the depth of two or three inches. The slag is first drawn off, and afterward the molten lead is allowed to run into a pan provided for the purpose, where it is skimmed and ladled into moulds.

Black-Lead, of which pencils are made, is not lead, though formerly considered so. More recently it was supposed to be a carburet of iron; but later experiments appear to have proved that it is only a peculiar form of carbon. Its proper name is plumbago, or *graphite*.

The finest quality of this mineral which has ever been discovered is obtained from a mine at Borrowdale, in Cumberland; but it is found in various parts of the world; and an inferior quality has been of late years imported from Mexico and Ceylon in considerable quantities, which is used principally for making crucibles or melting-pots, for diminishing the friction of machinery, and for protecting iron from rusting. The finer qualities suited for pencils being too valuable for these uses.

It is sometimes found crystallized, but more generally in detached masses or nodules, some of which weigh four or five pounds each. At Borrowdale, "nests" of these are formed in a greenstone rock, which constitutes a bed in the clay slate. This peculiarity is the cause of its being often "lost," when the miners have to seek at random for a new supply.

The age of the Cumberland mines cannot be exactly ascertained, but they have been occasionally worked ever since the reign of Queen Elizabeth. They are private property. There are traditions of the time when the value of this curious mineral was so little understood, that the shepherds used it in large quantities for marking their sheep. After this time came one in which the proprietors made enormous profits, and the quality of the mineral was so good, that a workman could in half an hour obtain as much as would sell for £1,000. It was the practice, at this period, to open the mines only occasionally, thus reducing the supply and raising the price. The modern importations from abroad have very much lessened the monopoly which enabled the proprietors to do this. Formerly, so great was the fear lest any of the precious material should be stolen, that houses were built at the entrances to the mine, in which the workmen were obliged to change their clothes, and were all searched before leaving their work to see that they had none secreted about them. The finest plumbago was also taken from the mine to Kendal, under a strong guard, and from thence conveyed to London by persons who were held responsible for its safe delivery.

Zinc is a metal which has been comparatively lately discovered in its pure form, though one of its ores, calamine stone, has long been known and used. It abounds in China, and the Chinese were the first to use it; they also exported it in large quantities to India, whence much was exported to England, until a full supply was found to exist there. The largest proportion of zinc or spelter, as it is frequently called in its metallic form, is obtained from the German states, which not merely supply the home markets, but have superseded the Chinese in the trade with India. Zinc is a hard bluish-white metal, not malleable when cold, breaking readily under the hammer, and showing particularly brilliant crystalline fracture; but at a moderately high temperature it possesses great malleability and ductility, can easily be drawn into wire and rolled into plates, and worked in other ways. Zinc is well suited for casting figures; it melts readily, liquifies completely, and therefore copies every line of the mould more accurately than harder metals. A cast can be made in zinc for one-sixth or one-eighth of the cost of bronze, and can afterward be bronzed to look almost as well as that metal. Zinc plates are used for many purposes, and in roofing they are valuable for their lightness, being about one-sixth part the weight of lead ones; they are not liable to rust or corrode from exposure to the air. Many vessels are now made of zinc, and for galvanic apparatus this metal is used.

Brass is not found in any mine as the metals we have been speaking of are—it is a compound metal, or, as it is properly called, an *alloy* of copper and zinc; it was well known in the earlier stages of the arts, long before pure zinc was discovered, being made of copper and calamine-stone, which is an ore of zinc. The manufacture of brass is said to have been introduced into England in 1649, by a German, who settled at Esher, in Surrey. Good brass is of a fine yellow color, ductile, and very malleable when cold; when heated, it is brittle; being in this respect a curious contrast to the zinc of which it is partially composed. Brass is the most convenient metal for making large, fine screws, astronomical instruments, microscopes, and many other things requiring great exactness; as, notwithstanding its compactness of texture, it is easily wrought at the lathe.

Brass is made thus: the copper intended to be used is poured hot into water, which makes it into little grains, or what is called *shot-copper;* this is done to increase its surface. The calamine-stone (carbonate of zinc) is heated red-hot, ground to powder, and washed; the ingredients are then fused together in the proportions of about forty-five pounds of copper to sixty pounds of calamine-stone; an equal bulk of charcoal, and some scrap brass, are usually added. The melted brass is cast into plates or bars; the plates are rolled into sheets, called latten, or beaten into thin leaves, called Dutch-gold, and used for inferior gilding. The bars are used by those who make small brass wares, or who melt it again with different proportions of copper, to make tombac, pinchbeck, and other imitations of gold.

These imitations are used to make a great many small articles, such as brooches and all sorts of jewelry, which are very cheap. In former times, watch-cases were frequently made of these metals, but it is not quite so common now.

Pins are made of brass wire, and are tinned afterward; the wire is cut into pieces the length of six pins, and the points of a handful are ground at once; a pin's length is then cut off, and the points ground again, and so on, until the wire is all used, and six pins have been made of each piece; the heads used to be a little ball, made with fine wire spun with a wheel, and then fastened on to the pin with a smart blow; but now they are made solid, the top of the wire being pressed in a die to form the head, which prevents its coming off; pins are polished by rubbing them in dry bran.

Britannia-Metal is composed of block-tin, a small portion of antimony and less than one-third as much copper or brass. This compound, which is bright and silvery looking, is now extensively used instead of pewter, and for many purposes to which pewter was never applied. It is very easy to work both by rolling, casting, turning, and planing, as well as by stamping in dies; consequently the articles made of it are almost unlimited in variety and very cheaply produced: teapots, candlesticks, and spoons, are among some of the most frequent applications of this metal.

Pewter is a dull-looking alloy, used for making plates and dishes, beer-measures, wine-measures, and larger vessels. For the first purpose it is very much gone out of use, being superseded by earthenware; but in former times all houses were supplied with pewter articles, and no small portion of the "plate" belonging to the nobles was of this material. Good hard pewter is made of tin, copper, and antimony; but a very inferior kind, and that most frequently met with, is made chiefly of lead, with a very small proportion of tin and copper in addition.

Bell-Metal, Gun-Metal, and Bronze, are all formed chiefly of copper, with the addition of tin, and in some cases small quantities of other metals.

All the metals are solid bodies, except mercury, and this becomes so when cooled to forty degrees below zero. It is the one used in barometers and thermometers to show the changes in the atmosphere; it is also called *quicksilver*. It is white, rather bluer than silver, and as it is from its great fusibility habitually fluid, it readily unites with many other metals, and imparts to them a degree of its characteristic quality; when these metallic mixtures contain sufficient mercury to render them semi-fluid at a mean temperature, they are called *amalgams*.

It is likewise employed for silvering looking-glasses, and for gilding, in which latter process the gold and mercury are laid on together in the form of an amalgam, and the mercury afterward dissipated by the action of the heat. It is also employed in the preparation of several powerful medicines, and in the manufacture of vermillion. But by far the largest quantity of mercury is used for amalgamation with native gold and silver, to facilitate the extraction of the pure metal.

The chief mines of mercury, or quicksilver, are in Spain, in the provinces of Asturias and Andalusia; there are mines too at Idria, in Carniola, which are very productive, and others in Tuscany and California. Mercury is found both native and mixed with sulphur, in which state it forms the red ore called cinnabar.

The Precious Metals Gold and Silver—the metallic substances first known to mankind, and from the first held in great estimation; the earliest mention on record of gold is in Genesis, where it says of the land of Havilah, "There is *gold*, and the gold of that land is good." In the time of Abraham it already passed as money by weight; and was used for making ornaments; nor are there lacking proofs that it was manufactured into many household articles. The abundance of gold in ancient times is very remarkable; for example, the treasures of Solomon, when he made so many things of pure gold; "none of them were of silver, for that was nothing accounted of in the days of Solomon," for "the king made silver to be as stones in Jerusalem." Nor does this appear to have been by any means a solitary instance; profane authors speak of the large accumulations of treasure both by sovereigns and private individuals.

Gold is found not in ores, like other metals, but in a pure or native state; it exhibits many diversities of appearance, being found massive, in scattered particles, in fibers or strings, reticulated or net-like, arborescent, tree-like, and also crystallized. Gold found in rocks is mingled with many different earthy fossils, and often with ores of other metals, and large quantities have always been found in the beds of rivers, which latter circumstance, joined with its beauty, comparative purity, and consequent easy reduction, may account for its always having been the first metal to attract barbarous tribes.

It has been found in some parts of every quarter of the globe, as before stated; it was first found in the East, and there are still mines in India, Japan, the Philippines, Sumatra, and Borneo; to which may be added Siberia. Gold has been found also in Africa, in such large quantities in one part that it has attained the name of the Gold Coast; Europe, too, possesses a little: there are, or more correctly there *were*, mines in many countries, and even in England; but all these sources were thrown into the shade when the discovery of America laid the treasures of Brazil, Choco, Chili and Mexico, open to the enterprise and cupidity of the Europeans; and in our own days we have seen these again superseded by the discovery of a new El Dorado, in California, and still more recently in Australia; from which two fields our present supply of gold is almost exclusively obtained.

In consequence of the pure state in which gold is found, gold mines can hardly be said to exist in the sense in which mines are generally understood; they are usually mere surface works, even though in some cases pits are sunk to the depth of many feet, neither is any smelting required as in the inferior metals; but refining is necessary, to effect which it is submitted to the processes of cupellation and parting, in the first of which it yields up every particle of lead or other common metal, and in the second is separated from any silver with which it may be alloyed.

The cupel is a small cup composed of calcined bones or some similar material, slightly moistened and compressed, which has the curious property of not only resisting the fire but of *absorbing* metallic bodies, when changed by heat into fluid scoria, while it *retains* them in their metallic form. The gold is put into the cupel in little buttons, and when fused a scum of lead and other metals rises, which running to the sides of the vessel is absorbed.

Silver being nearly as difficult of oxdyation as gold, cupellation would not avail to separate it, recourse therefore is had to another process; the gold is rolled out into thin plates, which are cut up and digested in hot diluted nitric acid, this dissolves the silver, and leaves the gold an undissolved porous mass. Gold is the most fixed and incorruptible of all bodies.

It is much more widely spread than gold, and differs from it as to the climates where it is found; gold may be called *tropical* in its habitat, whilst silver abounds most in high latitudes, or at great alitudes. The most celebrated mines of Europe are in Norway and Sweden, and those of Mexico and Peru are in the center of the chain of the Andes, in the most cheerless regions of perpetual snow; there are mines also in the north of Asia, but none have yet been discovered in Africa. The most productive mines in the world are those of South America.

Silver is found in ores, and in this it differs from gold, for though it is sometimes found pure it also occurs in various ores; some more and some less frequently met with. One rather remarkable state in which it is found is an amalgamation with mercury, and semi-fluid. Native, or as it is sometimes called, virgin silver, is not only met with in masses, but in large patches, beautifully branching out from the central deposit, or sometimes extending into an entangled net. Herrera, the Spanish historian, attributes the discovery of the silver mines of Potosi in Peru to the fact of an Indian hunter having pulled up a shrub, and found its roots entwined with filaments of pure silver, which turned out to be ramifications from an enormous mass of the metal. Silver is frequently met with in lead ore.

Silver is extracted from its ores either by the ordinary process of smelting, or by amalgamation; this latter process is carried on in South America, and also largely in Saxony, the chief advantage being the saving of fuel. When the ore contains much sulphur, etc., it is necessary to separate it from these before applying the mercury; this is effected by putting it into a furnace with ten per cent. of common salt, which decomposes the ore; on being cooled it is reduced to an impalpable powder, and is then ready for amalgamation, which is effected in revolving barrels. The charge in each barrel consists of ore, mercury, iron, and water; the barrels are made to revolve for sixteen or eighteen hours, during which time the silver is set free, by the chemical action of the iron, from the combination in which it was held, and then unites with the mercury; whilst the sulphate of soda and other soluble matters resulting from the addition of the salt are dissolved by the water. The amalgam is then filtered, and heat being applied, the mercury flies off and the silver remains. It is afterward subjected to cupellation like gold.

The precious metals are very seldom used alone; pure gold would not be hard enough to stand any amount of wear, it is therefore alloyed, even for the gold coinage, with a small portion of either copper or silver, and for trinkets and other small wares, the proportion of alloy is often much greater. Gold vessels and large ornaments are generally of great value; this is enhanced by their being so frequently made from models which are destroyed in the process, and therefore each is unique. A considerable quantity of gold is employed for gilding, for which purpose it is generally used in the form of gold-leaf.

A number of small thin plates of gold, about an inch square, are laid two together between pieces of vellum about four times that size, and with twenty thicknesses of the latter on the outside, the whole being inclosed in a parchment envelope; it is then beaten on a block of marble with a heavy hammer, till the gold is spread out to the size of the vellum; the pieces of gold are taken out, cut into four, and replaced with a prepared animal membrane between each, afterward known as goldbeaters' skin; the beating and cutting is repeated several times more, and, when the gold is thin enough, it is trimmed up and carefully placed in little books for sale. Gold being by far the most malleable metal, it is capable, when pure, of being beaten into leaves so thin that 282,000 would be only one inch in thickness; in this state it is translucent, transmitting light of a beautiful green color.

Silver is harder than gold, but it, too, is alloyed with copper for coinage. Large quantities of silver are used for making *plate;* by which term we understand spoons, forks teapots, salvers, castors, inkstands, and a great variety of other articles, either useful or ornamental, or both;

these may be either of solid silver, or, as is very common, of copper or steel, plated or covered over with the more precious metal.

The common method of plating on copper is the following: an ingot of copper being cast, is filed square and smooth, and a piece of silver is placed upon it, the two surfaces being perfectly clean; a little borax is introduced between the two metals, they are bound together with iron wire, and then heated in a furnace nearly to the melting point; the small quantity of borax acts as a flux, and thus they are fused together. When this is effected, the metals are rolled out as thin as required, and this sheet forms the basis of every article of whatever shape or form, and however it is to be ornamented when finished; to produce ornaments, leaf silver is stamped in iron dies representing the ornaments required, which, when removed from the dies, is filled with an alloy of lead and tin.

Electro-Plating is a new discovery, and has very much superseded the process we have just described, at least for the better kinds of plated goods. In electro-plating pure silver is precipitated, by the action of a galvanic battery, from a solution in which it is held, on to the articles after they are formed; this process possesses many advantages; among the rest may be mentioned, that, instead of copper, a hard white metal can be used, which wears better; the electro-plating also renders the application of embossed borderings and ornaments more easy, and they are more durable.

Platinum is as indestructible as gold, hard as iron, in color resembling silver, and extremely ductile and tenacious. Gold has been drawn into wire of which 550 feet only weighed a grain, and which is 1-5000th of an inch in diameter, but platinum has been made into a wire of only one-sixth this diameter. Platinum is a metal but recently discovered, not having been known earlier than the 18th century. The principal supply comes from South America, but Russia draws large quantities of it from mines in the Ural Mountains. There was a coinage of platinum money in Russia, but it is now called in.

The ancients are supposed only to have known the seven principal metals: gold, silver, copper, iron, lead, tin, and mercury; none were added to the list in the dark ages, but in the 15th and 16th centuries, zinc, antimony, and bismuth were discovered; in the 18th, platinum, nickel, arsenic, cobalt, and manganese, with seven or eight others; and in the present century, some twenty more.

Antimony, which is very hard, is used as an alloy with tin and lead for various purposes where great hardness and durability are needed; thus *type-metal*, of which are made the little letters which must be firm enough to bear the pressure of the heavy printing-press, and yet retain all their delicate lines sharp and clear, is composed of lead and antimony. This metal is also used in medicine, and its oxyd in coloring glass.

Bismuth is chiefly remarkable on account of its extreme fusibility; to exhibit which quality spoons are sometimes made of it, which, when put into boiling water, or even very hot tea, melt and lose their form. It is used as a flux, and with the addition of tin, lead, or copper, it makes solder.

Nickel is a hard, white metal, more nearly resembling silver than tin does; it is chiefly brought from Germany to this country, and is much used in the manufacture of German silver. It is not, however, abundant, which remark applies to all these new metals, cobalt excepted.

Arsenic is used in many metallic alloys; its various oxyds are ingredients in different dyes; it is used as a flux for glass, and to produce some kinds of coloring in glass. It is likewise put into some composite candles; and, though a virulent poison in all its forms, is employed as a medicine; the arsenic of commerce is a white oxyd of the metal.

Cobalt, though rarely used in the metallic form, is invaluable for the beautiful blue pigment which its oxyds afford, and which is the only blue color employed in the manufacture of china and glass. The color known as smalt, is glass colored with cobalt, and ground to an impalpable powder. One grain of cobalt will give a full blue to two hundred and forty grains of glass.

The Black Oxyd of Manganese, which is the most common form in which this metal is found, is very useful in many chemical preparations; and is employed to give a violet-color to china and glass, and used by glass-makers to bleach out the greenish or yellowish hue glass is sometimes inclined to have.

THE FARM AND GARDENS.

PREFACE TO THE FARM AND GARDEN.

The object of this manual is to place before its readers the latest discoveries and improvements in the various departments upon which it treats. It embodies the condensed observations and experiments of scores of the best practical cultivators in Europe and America, and will, the editor trusts, form an acceptable, convenient, and reliable guide to him who is interested in the cultivation of a farm, a vegetable, fruit, or flower garden.

In The Farm will be found a careful consideration of the nature and constituents of the different soils, and the means of their improvement by draining, subsoil plowing, manuring, &c., &c.; and specific directions for planting and cultivating the several farm crops. Fences, farm implements, and the animals, birds, and insects which infest or destroy the farmers' crops, are chapters which, it is believed, will also be examined with interest and profit.

Gardening is alike healthy, pleasant, and profitable. The productions of a good garden are appreciated by all; but by none so fully as by those whose heads and hands have been the instruments of their growth. In compact towns, where the people are packed like the bricks of their dwellings, gardens, of course, cannot be had; but in all the country, and in nineteen-twentieths of our smaller cities and villages, good gardens may and should be had; and in this work plain and practical directions will be found for the planting and culture of all the garden vegetables, and of such fruits as are appropriate to it.

The cultivation of fruit is the most encouraging, pleasant, and profitable of all the industrial pursuits. Nothing which our earth produces is so generally palatable to all, or its use so generally productive of health and comfort. To look upon a carefully selected and arranged fruit-garden is one of the most satisfying and tempting of earthly sights. From the first swelling of the leaf and fruit buds, through every succeeding process in the development and growth of leaves, flowers, and fruit, to the perfect maturity of the latter, it is one continued offering of hopeful enjoyment, alike pleasing to young and old. But he who would enjoy this pleasure in its fullest fruition should himself have planted the trees, and nurtured and watched their development. The incentives, therefore, to the planting and culture of fruit, are of the strongest kind, and the explicit and clear directions which we give for that purpose will, it is believed, be appreciated.

The *beautiful*, in nature, is everywhere blended with the *useful*. It is not alone with grains, grasses, vegetables, and fruits that the earth teems. Everywhere, and at nearly all seasons, a profusion of flowers spontaneously expand, and for what purpose? Clearly for the contemplation of its rational inhabitants. They were intended

> "To raise the mind, improve the human heart,
> And goodly precepts gracefully t' impart."

As cultivation destroys the beautiful wild-flowers that were once so charming, if we do not supply their places by cultivated varieties, we shall be devoid of those happy influences which they so certainly produce. The knowledge of flowers and their mode of culture are but imperfectly understood by the mass of our people. Very few American families number among their books any thing upon the culture of flowers. It was to supply this general want that this part of our work has been prepared. Its previous departments have been confined exclusively to the *useful*; and now, for the especial use and satisfaction of our lady readers, who are, everywhere, whether in prose or poetry, not only the true standards but the just arbiters of beauty, we here devote a chapter to the *beautiful*, and respectfully invite their attention to the FLOWER-GARDEN; that while fathers, husbands, brothers, and *dearer ones* are employed in the useful and sterner duties, they may show them

> "Buds and sweet blossoms redolent of spring."

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THE FARM.

I. SOILS.

The Nature and Composition of the Soil, and consequently its greater or less aptitude to the growth and maturity of vegetable productions, depend chiefly on the proportion and mechanical structure of the various substances of which it consists. When the soil is favorable to the chemical action by which the elements are combined to form vegetable substances, and admits that quantity of air and moisture without which this chemical action cannot take place, in any given climate or temperature, vegetation goes on rapidly, and all the plants which are suited to the climate grow in the greatest perfection, and bear abundant fruits.

It is not, however, very frequently the case that a soil possesses all those qualities on which great fertility depends. So many circumstances must concur to make a soil highly fertile, that the great majority of soils can only be made to produce abundantly by being improved by art both in their texture and composition—hence the practice and science of agriculture, which is founded on experience, but to which every progress in science also affords great assistance, by the additional light which every new discovery throws on the true theory of vegetation.

There are various modes of distinguishing soils, without entering into a minute analysis of their component parts. The simplest and most natural is to compare their texture, the size and form of the visible particles of which they are composed, and to trace the probable source of their original formation from the minerals which are found around or below them, or the rocks from which they may have been slowly separated by the action of the elements.

A Good Soil is composed of one-third coarse sand, one-third very fine sand, and one-third impalpable matter, in which there is silica in the greatest quantity, alumina and lime in a smaller, and from four to ten per cent. of organic matter.

Analysis of Soils.—In ascertaining the value of a soil for agricultural purposes, two circumstances should be carefully noticed. The first is the permeability of the soil to water; and the second is its power of absorbing moisture from the atmosphere. To ascertain the first, it is only necessary to place an equal weight of different soils in glass tubes of equal diameter, pressing them so that they shall occupy equal spaces, but not filling the tubes. Then place them upright in cups, and pour equal quantities of water over each soil. Examine which has the surface first dry, and how much water runs through each in a given time.

That which presents a dry surface, while it holds most water in its pores, is probably the best. To ascertain the comparative absorption of moisture, the soils are dried in pairs on a plate of metal heated by steam, or at a heat of 212°, to expel the water. They are then placed in equal quantities in similar flat cups or dishes, and placed in opposite scales of a balance, and poised. The apparatus is exposed to a moist atmosphere out of doors, or in a cellar, and occasionally examined. That which is heaviest is, in general, the most fertile, and contains most humus. If there are more than two soils, they are compared with each other, and with a third as a standard.

By these simple means any person, however ignorant of chemistry, or unaccustomed to make accurate experiments, may soon satisfy himself as to the comparative value of different soils which have never yet been cultivated; how they may be improved, and what crops are best suited to them—things of the greatest importance to those who go to distant parts in the hopes of obtaining good land at a moderate price, and cultivating it to advantage.

But we have intimated that there were other means of ascertaining the mechanical texture of soils than by sifting them. This is by washing with pure water. For this purpose nothing is required but a few flat plates and large cups. Some of the soil is formed into a very thin mud by stirring it in a cup nearly full of water. The finer particles are successively poured off from the sand or grit, which at last remains pure, so that the water added to it is no longer discolored. This being dried and weighed, gives the coarse sand. The water and earth poured off are allowed to settle. A common soup-plate is found a very convenient vessel for this purpose. On the surface of the deposited earth will be found all the undecomposed vegetable matter, which, with a little care, is easily taken off, dried, and weighed. The finer portions of the earth can be poured off successively by shaking the whole moderately, till nothing but very fine sand remains. The alumina and impalpable silica will remain long suspended in the water, and allow any sand yet remaining to be deposited. They may be rapidly separated from the water by filtration through stout blotting-paper; but it is preferable to pour them into a glass tube about one inch in internal diameter, with a cork fitted into the lower end. In this tube the earths slowly fall to the bottom, and any variety in the size of the particles causes a line more or less distinct, which can be observed through the glass; and thus a very good idea may be obtained of the proportion of the different earths, as far as regards the size of their particles. For their chemical differences, the preceding process must be adopted.

It is often useful to ascertain nearly the composition of a soil, without having time or opportunity to make accurate experiments. A graduated glass tube, which can be carried in the pocket, and a small vial with a ground stopper, containing diluted muriatic acid, and secured in a wooden case for fear of accident, is all the apparatus required. A little of the soil is taken and moistened with water; a few drops of the acid are poured on; and by the greater or less disengagement of bubbles the proportion of calcareous matter is guessed at, and its presence proved. The soil mixed with water is poured into the glass tube and well shaken. In a few minutes the coarse sand is deposited, shortly after the finer sand, and lastly the clay and impalpable matter, of which the lightest remains longest suspended. Distinct rings can be observed in the deposits, and the graduated tube shows their proportion. A person accustomed to this method will guess with great precision the general qualities of the soil; and when the geological structure of the neighborhood and the nature of the subsoil are taken into consideration, the value of the land for pasture or cultivation is guessed with little danger of making very glaring mistakes. To surveyors and valuers this method is of very great help, when other means are not at hand.

Professor J. F. W. Johnson has given the following tabular view of the composition of soils of different degrees of fertility:

IN ONE HUNDRED POUNDS.	Fertile without Manure.	Fertile with Manure.	Very Barren.
Organic matter	9.7	5.0	4.0
Silica	64.8	83.3	77.8
Alumina (the base of clay)	5.7	5.1	9.1
Lime	5.9	1.8	.4
Magnesia	.9	.8	.1
Oxyd of iron	6.1	3.1	8.1
Oxyd of manganese	.1	.3	.1
Potash	.2		
Soda	.4		
Chlorine	.2		
Sulphuric acid	.2	.1	
Phosphoric acid	.4	.2	
Carbonic acid	4.0	.4	
Loss during the analysis	1.4		.4
Total	100.0	100.0	100.0

In order to ascertain the probable fertility of a soil, it is very useful to analyze it, and find out the proportion of its component parts. To do this with great accuracy requires the knowledge of an experienced chemist; but, to a certain degree, it may be easily done by any person possessed of an accurate balance and weights and a little *spirits of salts*, or muriatic acid. For this purpose some of the soil, taken at different depths, not too near the surface (from four to eight inches, if the soil is uniform in appearance), is dried in the sun till it pulverizes in the hand, and feels quite dry; the small stones and roots are taken out, but not minute fibers. A convenient portion of this is accurately weighed; it is then heated in a porcelain cup, over a lamp or clear fire, and stirred till a chip or straw put in it turns brown. It is then set to cool, and weighed; the loss of weight is the water, which it is of importance to notice. Some soils, to appearance quite dry, contain a large proportion of water, others scarcely any. It is then pulverized and sifted, which separates the fibers and coarser parts. The remainder, again weighed, is stirred in four or five times its weight of pure water; after standing a few minutes to settle, the water is poured off, and it contains most of the humus and soluble substances. The humus is obtained by filtration, well dried over the lamp, and weighed. The soluble substances are obtained by evaporating the water; but, unless there is a decidedly saline taste, this may be neglected. The humus may be further examined by heating it red-hot in a crucible, and stirring it with a piece of the stem of a tobacco-pipe, when the vegetable part will be consumed, and the earths remain behind; thus the exact quantity of pure vegetable humus is found. Some muriatic acid, diluted with five times its weight of water, is added to the deposit left after pouring off the water containing the humus and soluble matter; the whole is agitated, and more acid added gradually, as long as effervescence takes place, and until the mixture remains decidedly acid, which indicates that all the calcareous earth is dissolved. Should there be a great proportion of this, the whole may be boiled, adding muriatic acid gradually, till all effervescence ceases; what remains, after washing it well, is siliceous and argillaceous earth. These are separated by agitation, allowing the siliceous part to settle, which it does in a few seconds. The alumina is poured off with the water, filtrated, heated over the lamp, and weighed; the same with the siliceous sand. The loss of weight is calcareous earth. In this manner, but with greater care and more accurate tests, various soils of known fertility have been analyzed, of which we will give a few examples.

A very rich soil near Drayton, Middlesex, examined by Davy, consisted of three-fifths of siliceous sand and two-fifths of impalpable powder, which analyzed was found to be composed of

	Parts.
Carbonate of lime	28
Siliceous earth	32
Alumina	29
Animal and vegetable matter	11
	100

This is a rich sandy loam, probably long and highly manured, fit for any kind of produce, and, if deep, admirably fitted for fruit-trees.

Another good turnip soil, by the same, consisted of eight parts of coarse siliceous sand and one of fine earth, which being analyzed consisted of

	Parts.
Carbonate of lime	63
Silica	15
Alumina	11
Oxyd of iron	3
Vegetable and saline matter	5
Water	3
	100

This is a very light sandy soil, and owes its fertility to the fine division of the carbonate of lime and the vegetable and saline matter. It may probably have been limed or marled at some time or other.

The best loam in France, according to Mr. Tillet, consists of

	Parts.
Fine siliceous sand	21
Coarse ditto	25
Carbonate of lime	37·5
Alumina	16·5
	100

A loam at Chamart, highly prized by the gardeners about Paris as the basis of their artificial soils, consists of

	Parts.
Argillaceous sand	57
Finely divided clay	33
Siliceous sand	7·4
Carbonate of lime, coarse	1
Ditto, fine	·6
Woody fiber	·5
Humus and soluble matter	·5
	100

The argillaceous sand is composed of fragments of soft stone, which retain moisture, and do not bind hard; the small proportion of humus is of no consequence where manure is to be had in any quantity.

A very rich heath or bog earth found at Meudon, and in great request for flowers and in composts, consists of

	Parts.
Gritty siliceous sand	62
Vegetable fibers partly decomposed	20
Humus	16
Carbonate of lime	·8
Soluble matter	1·2
	100

This soil, like our bog earth, would be very unfit for the growth of corn; but, from the quantity of humus and vegetable matter, is highly useful in composts and artificial soils; mixed with lime, it would make an excellent top-dressing for moist clay soils.

Mr. Thaer has given a classification of soils of known qualities, which we think worthy of notice. It is as follows:—

No.		Clay, per cent.	Sand, per cent.	Carb. of Lime, per cent.	Humus, per cent.	Value.
1.	First class of strong wheat soils.	74	10	4½	11½	100
2.		81	6	4	8 2-5	98
3.		79	10	4	6½	96
4.		40	22	36	4	90
5.	Rich light sand in natural grass	14	49	10	27	?
6.	Rich barley land	20	67	3	10	78
7.	Good wheat land	58	36	2	4	77
8.	Wheat land	56	30	12	·2	75
9.	Ditto	60	38	Very insignificant quantities.	2	70
10.	Ditto	48	50		2	65
11.	Ditto	68	30		2	60
12.	Good barley land	38	60		2	60
13.	Ditto, second quality	33	65		2	50
14.	Ditto	28	70		2	40
15.	Oat land	23½	75		1½	30
16.	Ditto	18½	80		1½	20

Below this are very poor rylands.

In all these soils the depth is supposed the same, and the quality uniform to the depth of at least six inches; the subsoil sound, and neither too wet nor too dry.

Nos. 1, 2 and 3 are alluvial soils, and, from the division and the intimate union of the humus, are not so heavy and stiff as the quantity of clay would indicate.

No. 4 is a rich clay loam, such as is found in many parts of England, neither too heavy nor too loose—a soil easily kept in heart by judicious cultivation.

No. 5 is very light and rich, and best adapted for gardens and orchards, but not for wheat; hence its comparative value can scarcely be given.

Nos. 6, 7 and 8 are good soils. The quantity of carbonate of lime in No. 8 compensates for the smaller portion of humus. This land requires manure, as well as the others below. In those from No. 9 downward, lime or marl would be the greatest improvement. Nos. 15 and 16 are poor light soils, requiring clay and much manure; but even these lands will repay the cost of judicious cultivation, and rise in value.

The last column, of comparative value, is the result of several years' careful valuation of the returns, after labor and seed had been deducted.

How to Improve Soils.—Soils are improved first by draining, trenching, and subsoil plowing; and second by the application to them of appropriate manures.

The most common and appropriate division of soils, in their native state, is into the *clayey*, *sandy*, *peaty*, and *loamy;* and the means for the improvement of each will be separately considered.

Clay is an essential component part of all fertile soils. A clay soil consists of a large proportion of alumina united to silica of various degrees of fineness, and frequently also a portion of carbonate of lime. When the silica is very fine, and intimately mixed with the alumina, the clay, although stiff in appearance, is fertile in proportion to the humus which it contains, or which is artificially added to it. It then forms that class of rich wheat soils which produce many successive abundant crops without change or manure. It has a strong affinity for water, which prevents the plants that grow in it being injured by drought; and it has a sufficient degree of porousness to allow superfluous moisture to percolate without making it too soft. All that is required for such a soil is a porous substratum of rock or gravel; and where this is not the case, sufficient under-drains must be made to produce the same effect.

To Improve Clay Soils.—The best after-treatment of clay soils is to plow them, wherever the ground freezes, in winter or late in the fall, thus subjecting them to the action of frost, which is by far the easiest and most efficient mode of rendering them fine and of easy subsequent cultivation. Once freezing and thawing subdivides and mellows a clay soil more than fifty spring plowings. It should never be moved in the spring or summer when wet, for then the sun will convert it into a substance allied to brick; but late in autumn, when the ground is soon to freeze, it is no objection, as the action of the frost will divide its particles. *Subsoil plowing* is the next mode of improving clay lands. The advantages of subsoiling are akin to draining. It carries the water further from the surface, and forms a deeper soil for the permeation of the atmosphere and the roots of plants. Where the subsoil is compact and impervious to water, but not wet for want of outlet or draining, it is useful to stir the soil to a great depth, but without bringing it to the surface, which may be done by a plow without a mould-board following a common plow in the same furrow. This is an excellent mode of draining, and at the same time keeping a reservoir of moisture, which in dry weather ascends in vapors through the soil, and refreshes the roots.

"To break the too great tenacity of clayey soils, sand seems to be the ingredient indicated; but so large a quantity is required to produce the desired effect, that its application on a large scale is generally considered impracticable. Lime is exceedingly useful as an ameliorator of clayey soils, inducing chemical combinations the mechanical effect of which is to break up the too great tenacity of the clay, while it adds, at the same time, an element of fertility which may perhaps be wanting. Gypsum or plaster of Paris has the same effect in a still more powerful degree. Ashes, coarse vegetable manures, straw, leaves, chips, etc., are also very useful, adding new materials to the soil, and tending to separate its particles and destroy their strong cohesion. In cold climates, plowing clayey lands in the fall, and thus exposing them to the action of the frosts and snows, has a beneficial effect. At the South, where there is little frost and frequent and heavy rains occur during the winter, the effect of fall plowing is very injurious. Clayey lands must never be plowed when wet."*

To Improve Sandy Soils.—Clay, marls, plaster, lime, and ashes, are the principal substances used for the improvement of sandy soils. Clay is spread thinly in autumn upon freshly-plowed grass lands, and thus subjected to the pulverizing influences of frost; and any desired crop may be grown the following spring. Carbonate of lime has a powerful effect on the fertility of a soil, and no soil is very productive without it. It is consequently used extensively as an improver of the soil. Plaster is sown either late in the fall or very early in the spring, at the rate of from one to two bushels per acre. Sown upon the last snows of spring, its effects are certain, or at any time when immediately followed by copious rain. This fact, however, should be understood by all who use this valuable fertilizer—and all should who cultivate even a garden—*that to dry plaster destroys its value.* Hence it should never be sown upon a dry soil, or exposed to drying suns or winds, before it has been thoroughly saturated with water. Sandy soils are benefited by plowing when wet, as they are thus rendered more compact.

Improvement of Peaty Soils.—Where a great extent of peat soil renders the improvement of it desirable, there are various ways in which it may be reclaimed. In some places the peat has been removed, and the loam which lay below it was found of a very fertile nature. This could only be done on the banks of rivers, into which the peat was floated by means of small canals dug through it, and communicating with the river. In all other cases the mode adopted has been that of

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* The Farm.

draining and consolidating. In draining a peat-moss, the water must not be let on too rapidly, for in that case the surface may become so loose and dry, that no vegetation can take place in it. If the water is drained off so as to leave two feet of peat dry above its level, this is all that is required for a beginning. The best improvement, and the most rapid, is produced by bringing sand or gravel in sufficient quantity to cover the surface with two or three inches of it. This will make a beginning of a soil in which potatoes may be planted. At first the surface will not bear the wheels of a cart or the tread of a horse; but in a short time a solid crust will be formed, which will increase in strength and thickness as cultivation advances. Manuring and liming are the most effective operations in bringing about this great improvement. Potatoes and oats are usually the first crops on reclaimed peat-mosses. It is long before they become capable of bearing wheat; nor is this crop to be recommended at any time, unless there be a good depth of soil formed over the peat. Laying-down to grass as soon as a certain degree of improvement has been made, and depasturing with sheep at first and cattle afterward, tend more than any other means to consolidate the surface and deepen the mould, which gradually increases by the decomposition of the tannin in the peat.

Improvement of Loams.—All attempts to improve the nature of a soil should have for their object the bringing it to a state of loam, by the addition of those substances which are deficient. If there is too much clay, chalk and sand may be added, or a portion of the clay may be calcined by burning, in order to destroy its attraction for water, and thus act the part of sand in forming the loam. Limestone or calcareous sand and gravel are still more efficacious for this purpose: they not only correct too great porosity, or too great tenacity, but also act chemically on the organic matter in the soil, rendering the humus soluble and fit to be taken up by the roots of plants. If there is too much sand, marl composed of clay and chalk is the remedy. Good loams require much less tillage than stiffer soils, and will bear more stirring to clean them than sands. Hence they are cultivated more economically, and more easily kept free from useless weeds; while the produce is more certain and abundant. They can be impregnated to a higher degree with enriching manures, without danger of root-fallen crops, or of too great an abundance of straw at the expense of the grain. For artificial meadows they are eminently proper: all the grasses grow well in good loams, when they are on a dry or well-drained subsoil, which is an indispensable condition in all good land. Sheep and cattle can be depastured on them during the whole year, except when there is snow on the ground. If there should be means of irrigation, no soil is better suited to it than a light loam on a bed of gravel; or even if the subsoil is clay, provided sufficient underdraining prevent the water from stagnating between the soil and subsoil, which, as practical men very properly express it, would poison any land.

A loamy soil requires less dung to keep it in heart than either clay or sand; for while it is favorable to the process by which organic matter buried deep in the soil is converted into insoluble humus, it also permits that part of it which is nearer to the surface to attract oxygen from the air, and thus it is converted into a soluble extract, which is to the roots of plants what the milk of animals is to their young—a ready prepared food easily converted into vegetable juices.

II. MANURES.

"Manures are the riches of the field."—Chaptel.

We shall here confine our observations to that class of manures which stimulate or enrich the soil.

Lime, as a manure, acts most powerfully in its caustic state, that is, when deprived of the carbonic acid which is generally united with it.

The use of quick-lime in rendering inert vegetable fibers soluble, and hastening the decomposition of animal substances, is of the greatest importance in agriculture. Substances may be rendered highly enriching in a short time, which, without it, would have lain long dormant in the soil or the dung-heap.

Quick-lime spread on a soil abounding in vegetable matter will make it active by dissolving the half-decomposed fibers and converting them into a soluble mucilage; being extremely minutely divided by its property of attracting moisture rapidly, a very small quantity produces an immediate effect. Hence it is generally spread over fallows or clover-leys which are preparing for wheat-sowing. If it were put on the land long before the seed were sown, it would have lost its chief power by attracting carbonic acid and returning to the state of carbonate or chalk, and all the expense of burning wood would be thrown away.

But the most valuable agent in decomposing organic substances is the salt and lime mixture, made as follows:—

Take three bushels of unslacked lime, dissolve a bushel of salt in as little water as possible, and slake the lime therewith—if the lime will not take up all the brine at once, which it will if good and fresh burned, turn it over and let it lie a day and add a little more of the brine, daily turning and adding until all is taken up.

This salt and lime mixture is exceedingly valuable. It destroys the odor of putrefying animal matters, while it retains the ammonia. Of itself it supplies plants with chlorine, lime, and soda, all of which are requisite. Any vegetable refuse whatever, leaf mould, turf, straw, chips, and even tan-bark, if kept moist and sprinkled throughout with this mixture, become thoroughly decomposed in a very short time, and if used for the bottom of pig-pens, stables, and yards, where they can absorb the urine, they become the very best of manure.

Pulverized Charcoal is a valuable fertilizer, and whenever it can be obtained it should be used by all progressive farmers. A given quantity of it by measure is of more value than the same quantity of plaster. This, to those familiar with the latter, will be a sufficient commendation.

Plaster.—So universal has become its use, and so general the appreciation of its utility, that nothing further need be said of it, except to add, that all grass and corn lands should receive an annual dressing of from one to two bushels per acre.* If sown at the right time it would pay a fine return even at triple the cost of the article.

A. B. Dickinson's Method of using Plaster on Seeds.—"I will tell you how you can put a coat of tar over all kinds of seed as evenly as a painter could put a coat of paint over a board with his brush. An iron kettle is the best to mix the tar and water. Have sufficient boiling water to cut the tar; mix it with the hot water; then pour in sufficient cold to make it near blood heat. Have sufficient water to stir whatever grain you put in, that the water and tar may come into contact with every part and particle; it will then be coated evenly and is ready to be taken out. Shovel it into a basket—for economy the basket may be placed over a tight barrel to catch the water; as soon as it is done draining throw into a tight box, where you can mix and put on whatever your soil lacks. If wheat or barley, you need not fear to apply lime and salt. If oats, corn, or buckwheat, plaster and salt. And on the soils of Yates county it would be beneficial to all of the above-named grains, to steep in strong brine overnight. Every species of grass-seed I sow with a heavy coat, and fasten as much plaster as possible, which draws moisture in a dry season, and prevents rotting in an excessively wet one, and I never fail to have my grass seed take well."

Barn-Yard Manure is, however, the great reliance of the farmer; and the best means of increasing the supply of that should be his constant study.

"There is one thing settled in farming, stable-manure never fails. It always tells. There are no two ways about it. There is here neither theory, nor speculation, nor doubt, nor misgiving. 'Muck it well, master, and it will come right,' is an old proverb. It is considered a fact so well established, that nobody thinks of disputing it. There is advantage in asking why barn-yard manure never fails. The answer is easy. It contains all that plants need for their growth."†

The vast Deposits of Peat or Swamp Muck found so generally throughout the country, furnish an excellent means of adding vastly to the quantity of manure. The peat should be thrown up in summer into cones, that it may lose a portion of its moisture and be lighter to carry. It may then be carted to such places as will render its use most convenient in the stables, cattle-yards, etc. In the stables, a layer from six to ten inches thick should be spread once a week to receive the fluid deposits of the animals, which it will absorb and hold, the solid being regularly removed. Once each week it should be removed and a new supply take its place. If cattle are fed in yards, and under sheds, it should be thickly strown over and beneath them. In the spring the following course should be pursued—a bottom of peat is to be laid in some dry and convenient place, six inches deep and fifteen feet wide; on this are to be put the manure from the stables and all the unfermented accumula-

* Professor Johnson has ascertained, by analysis, that an ordinary crop of clover or sainfoin will yield per acre from one and a half to two hundred weight of sulphate of lime. This is precisely the quantity usually applied per acre in those parts of the country where plaster is in most general use.

† Dana.

tions of the winter, to the depth of ten inches, then six inches of peat, and over this four inches of dung, and so on, alternately, to the height of four or five feet. The whole should then be surrounded and covered with peat about one foot in thickness. The proportion of fresh dung is about seven cart-loads to twenty-one of peat, if the weather is mild; but more dung is required if the weather is cold: over this heap ashes or lime may now be spread, in the proportion of a cart-load to twenty-eight of the compost. The dung should not have fermented much before it is used, and if it is watered with urine or the drainings of a dunghill, the effect will be more rapid. Animal matter, such as fish, refuse of slaughter-houses, and every substance which will readily undergo the putrefactive fermentation, will accelerate the process, and save dung in the compost. Where pigeons' dung can be procured, a much smaller quantity will produce the desired effect. The heap should not be pressed down, but be left to settle by its own weight. If the heat produced by the fermentation is very great, the whole heap may be turned over and more peat added to it. This will keep up the heat till the whole is reduced to a uniform mass of black mould. It may then be put on the land in the same quantity that farm-yard dung would have been, and consequently, by a little labor, four times the quantity of manure is produced by the mixture of the peat with the dung. It is found that lime is not essential to the formation of this compost. The fermentation excited is sufficient to decompose the tannin and convert it into a soluble extract. The fibers, partially decomposed, are reduced into vegetable mould, and the whole assumes a uniform and rich appearance. A complete chemical change has taken place, and the peat, from being very inflammable, is now scarcely capable of combustion, and that only in a very great heat. There is no better or more economical mode of converting peat into a rich manure. In summer the whole process may be completed in eight or ten weeks; in winter it takes a longer time; and it may be useful to give the heap an occasional lining of fresh dung, as is done with hot-beds in gardens to renew the heat.

Hog Manure is of the most valuable kind. By freely supplying the sty with muck, as just intimated for stables, or with loam, refuse, litter, etc., a surprising quantity may be thus manufactured. A single swine in a year will saturate with his urine and convert into the best manure, ten loads of swamp muck or loam.

Manure of Fowls.—It has been said by a careful agricultural chemist, that *one pound of the manure of fowls that has not been exposed to the sun and rains is equivalent in value to fifty pounds of stable-manure.* Though the expression may seem difficult of belief, its value, nevertheless, is clearly so great as should lead to its careful preservation and use, instead of permitting its worse than useless expenditure upon the branches of fruit-trees, the utensils stored in open sheds, or upon the backs of animals which have sought shelter there.

Green Manures are best suited to comparatively heavy soils; yet their free use in all varieties of soil has the general sanction of intelligent farmers. Red clover, sainfoin, buckwheat, Indian corn, cow-pea, etc., are the crops generally employed for this purpose. They should be plowed in when in blossom.

The advantages of green manures consist mainly in the addition of organic matter which they make to the soil. The presence of this aids in the liberation of those mineral ingredients which are there locked up, and which, on being set free, act with so much advantage to the crop. The roots also exert a power in effecting this decomposition, beyond any other known agents, either of nature or art. Their minute fibers are brought into contact with the elements of the soil, and they act upon them with a force peculiar to themselves alone. Their agency is far more efficacious for this purpose than the intensest heat or strongest acids, persuading the elements to give up for their own use what is essential to their maturity and perfection. By substituting a crop for a naked fallow, we have all the fibers of the roots throughout the field, aiding the decomposition which is slowly going forward in every soil.

Clover and most broad-leaved plants draw largely for their sustenance from the air, especially when aided by the application of gypsum. By its long tap roots, clover also draws much from the subsoil; as all plants appropriate such saline substances as are necessary to their maturity, and which are brought to their roots in a state of solution by the up-welling moisture from beneath. This last is frequently a great source of improvement to the soil. The amount of carbon drawn from the air in the state of carbonic acid, and of ammonia and nitric acid, under favorable circumstances of soil and crop, is very great; and when buried beneath the surface, all are saved and yield their fertility to the land; while such vegetation as decays on the surface loses much of its value by evaporation and drainage. In the green state, fermentation is rapid, and by resolving the matter of plants into their elements, it fits the ground at once for a succeeding crop.

The following from the Hon. Daniel Lee, editor of the *Southern Cultivator*, is commended to the attention of Southern farmers:

"The first thing I did when I came to Georgia, a year and a half ago, and saw the extreme nakedness of the land, was to recommend the seeding with rye, at the last plowing in corn-fields, or soon after the crop ceases to grow, with a view to have this winter plant gather up from August till March whatever available atoms might be within reach of its roots and leaves. As the earth does not freeze, and heavy, washing rains fall in winter, 'the fat of the land' is largely consumed, and is either lost, like a burned candle, in the atmosphere, or carried like water from a dung-heap, into ditches and 'branches.' Barley, oats, and wheat all do well here, sown in November or December. It is now the 6th of February, 1849, and I have this day seen a field of oats which has been cut in part for soiling, for some weeks. Another, in barley, is so stout as to fall down or lodge. Winter pastures of rye are very valuable for stock of all kinds, although there are some clayey soils that the treading of cattle and sheep injures.

"Acting on my theory of keeping the earth always covered with some growing vegetation, Mr. M. B. Moore, of this city (Augusta), raised last season thirty-four and a half bushels of wheat from one of seed, which was harvested about the 20th May; then a crop of hay, equal to a ton and a half to the acre, which was mown in August; and then a crop of pease, which was harvested in November—all from the same land. The land is now in wheat, to be harvested in May next, as before. There is no difficulty in growing three crops of small grain in a year at the South, if one is cut green for hay, as oats, pease, barley, and rye are often cut. To enrich the soil, I assume that the manure derived from both the grain and straw, or of the green crops, is all carefully saved and duly applied to the land. As about sixty per cent. of the hay and other food eaten by a cow, sheep, or horse is lost in vapor and carbonic acid, thrown out of the lungs in the process of breathing, and through the pores of the skin in insensible perspiration, one will increase organic matter in a poor soil much faster to plow-in clover, peas, timothy, and rye, than to feed these to domestic animals, and apply all their excretions to the land."

The following table from Boussingault gives a comprehensive view of the proportion of azote or nitrogen contained in the most common manures, and of their quality and equivalents, as compared with farm-yard dung. Thus ten pounds of fresh cotton-seed oil-cake are equal in value to one hundred fresh or wet farm-yard dung, as far as the nitrogen in each is concerned. To form a perfect table of equivalents, the phosphates, potash, etc., must be also taken into consideration.

	Water per 100.	Azote in 100.		Quality according to state.		Equivalent according to state.	
		Dry.	Wet.	Dry.	Wet.	Dry.	Wet.
Farm-yard dung	79.3	1.95	0.41	100	100	100	100
Dung from an inn-yard	60.6	2.08	0.79	107	107	94	51
Dung water	99.6	1.54	0.06	78	2	127	68
Withered leaves of carrots	70.9	2.94	0.85	150	212.5	66	47
Do. do. of oak	25.0	1.57	1.18	80	293	125	34
Oyster-shells	17.9	0.40	0.32	20	80	488	125
Oak saw-dust	26.0	0.72	0.54	36	135	256	74
Oil-cake of cotton-seed	11.0	4.52	4.02	231	1000	32	10
Solid cow-dung	85.9	2.30	0.32	117	80	84	125
Urine of cows	88.3	3.80	0.44	194	110	51	91
Mixed cow-dung	84.3	2.59	0.41	132	102.5	75	98
Solid horse-dung	75 3	2.21	0.55	113	137.5	88	73
Horse-urine	79.1	12.50	2.61	641	652.5	15½	14⅓
Mixed horse-dung	75.4	3.02	2.74	154	185	66	54
Pig-dung	81.4	3.37	0.63	172	157.5	58	63
Sheep-dung	63.0	2.99	1.11	153	277.5	65	36
Poudrette of Belloni	12.5	4.40	3.85	225	962	44	10½
Pigeons' dung	9.6	9.02	8.30	462	2075	21½	5
Guano from England	19.6	6.20	5.00	323	1247	31½	80
Idem	23.4	7.05	5.40	361	1349	28	74
Guano imported from France	11.3	15.73	13.95	807	3487	12½	28½
Dried muscular flesh	8.5	14.25	13.04	730	3260	13½	3
Liquid blood	81.0		2.95	795	3045	12½	3¼
Fresh bones	30.0		5.31		1326		7½
Feathers	12.9	17.61	15.34	903	3835	11	2½
Cow-hair flock	8.9	15.12	13.78	775	3445	13	3
Woolen rags	11.3	20.26	17 98	1039	4495	9½	2¼
Horn-shavings	9.0	15.78	14.36	809	3590	12⅓	3
Wood-soot	5.6	1.31	1.15	67	287·5	149	35
Vegetable mould		1.03		53		189	33

Night Soil is a very valuable fertilizer. It should be composted with powdered charcoal, peat, or plaster. When charcoal is freely used, this substance becomes entirely inodorous, and an offensive nuisance is thus converted into a valuable application to any crop.

Guano is the substance of the manure of birds with the water evaporated. The Peruvian and Bolivian are the best varieties, and when these can be bought pure, delivered at not over three dollars to three dollars and a half per hundred weight, it is generally the cheapest manure to be obtained, as it is so easily applied—the labor of applying other manures often approaching the price of guano. It is well to apply about two hundred weight per acre, with one-half the usual quantity of other manure. Guano should never in a fresh state come in contact with seeds or the roots of plants, as it is sure to destroy their vitality. In setting out fruit-trees and shrubs of all kinds, guano is the cheapest and most convenient manure to apply. After the holes are dug, sprinkle the bottom thinly with a handful of guano. Cover this at least three inches deep. On this you may plant your trees with safety, and after the roots are covered, a little more may be sprinkled, and the whole covered with soil. But the great value of guano is in forming liquid manure; one pound of guano to five gallons of water, applied once a week, will add wonderfully to the growth of any plants watered with this mixture. For very delicate plants, twice the above quantity of water should be given. If guano is not to be had, the manure of fowls is a good substitute. This liquid is especially valuable in the flower-garden. It must be poured upon the roots, and not upon the leaves or collars of the plants. On lawns, a pound sprinkled upon each square rod will restore their verdure. A great advantage of applying guano is that no seeds of weeds are scattered in the soil.*

Bones are an especially useful application to almost any crop. Bones contain sixty-six parts of earthy matter, mostly phosphate of lime, and thirty-four parts of gelatine. Phosphate of lime, next to ammonia, is the most necessary application to a soil, because it is the first element exhausted. Gelatine is rich in nitrogen, so that in bones are united the most valuable organic and inorganic manures. Applied whole, bones decompose too slowly to be of much value, and would be greatly in the way of tillage. They may be broken small, the fine dust sifted out, and the remainder moistened and thrown into heaps to ferment a few months. Bones can be dissolved by boiling in strong lye, and when dried by mixing with plaster, ashes, etc., may be applied broadcast or in drills. The best way to treat bones is to dissolve them in sulphuric acid, forming superphosphate of lime. A carboy of sulphuric acid, costing about four dollars, at wholesale, in the cities, and containing one hundred and sixty pounds, will dissolve about three hundred pounds of bones. The bones should be put in a tub. A portion of the acid, equal to one-third, should be diluted by pouring it into three times its bulk of water, and then should be poured upon the bones. After standing a day or two, pour on another portion of diluted acid, and if not already dissolved, in a day or two after the remainder should be added. The

* "Gardening for the South."

mass must be often stirred. The bones will dissolve into a kind of paste, which may be mixed with thirty times its bulk of water, and used as a liquid manure, but it is more convenient in practice to mix it with ashes, saw-dust, or fine charcoal. Three bushels of these dissolved bones are sufficient for an acre. The acid has converted the bones into a superphosphate of lime, which is very soluble, and is readily taken up by the plant. This is the most valuable of all manures for the turnip, and the quantity needed for the acre is so little that the expense is less than almost any other application.*

We close this article by the following pertinent extract from "The Farm:"

"All the urine, as well as all the solid excrements of animals, should be carefully preserved. It is very rich in nitrogen and the phosphates, and some writers on agriculture contend that its value, if properly preserved and applied, is greater than that of the dung. From an experiment made in Scotland it appears, that in five months each cow discharges urine, which, when absorbed by loam, furnishes manure enough, of the richest quality and most durable effects, for half an acre of ground. Think of this, ye American farmers, who are accustomed to allow so much of this richness to run to waste. *The urine of three cows for one year is worth more than a ton of guano, which would cost from fifty to sixty dollars.* Will you continue to waste urine and buy guano? Various methods of preserving and applying it will suggest themselves to the intelligent farmer. Stables may be so constructed that the liquid discharges of the cattle, together with the wash of the barn-yard, may be conducted to a tank or cistern, to be pumped out and applied directly to the land, or absorbed by saw-dust, turf, etc., and used in that form. If allowed to stand long in the tank, in a liquid form, fermentation is liable to take place, and the ammonia to pass off; but a few pounds of plaster of Paris occasionally thrown in will cause the formation of the sulphate of ammonia, which will not evaporate.

"But the waste of manures is not confined to those of the liquid form. The solid excrements of the animals are often left to drain, bleach, or ferment, till the greater portion of their most valuable elements have disappeared. *Stable manures should be sheltered from the sun and rain, and fermenting heaps so covered with turf or loam as to prevent the escape of the fertilizing gases.* Plaster, as in the case of urine, will aid in retaining the ammonia. Boussingault, one of the most accurate of experimenters in agricultural chemistry, states, that while the nitogen in fresh horse-dung is two and seven-tenths per cent., that in the fermented and dried horse-dung is only one per cent. Horse-dung should be mixed at once with other manures, or with turf or loam, to retain its full value. The manure of sheep is strong and very active, and, next to that of the horse, is most liable to heat and decompose."

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* "Gardening for the South."

III. ROTATION OF CROPS.

As different plants appropriate different substances, the rotation of crops has considerable influence in retaining and economizing the fertility of the soil. If the same kind of plants are continued upon the same soil, only a portion of the properties of the manure applied is used, while, by a judicious rotation, every thing in the soil, or in the manure, suitable for vegetable food, is taken up and appropriated by the crops. Some vegetables, as onions and carrots, are very exhausting to the soil, while lettuce is very slightly so. Hence, however plentiful manure may be, a succession of exhausting crops should not be grown in the same place, because abundance is no excuse for want of economy, and because manure freshly applied is not so immediately beneficial as those remains of organized matter, which, by long continuance in the soil, have become impalpably divided and diffused through its texture, of which each succeeding crop consumes a portion. Those plants generally are least exhausting which have the largest surface of leaves, not only because they are made up of a greater proportion of aqueous matter, but also because they are enabled to obtain more in proportion of their food from the atmosphere. A rotation was formerly thought necessary, from an idea that each plant throws off from its roots, into the soil, certain matters which are injurious to others of the same species afterward grown upon the soil, but this view can hardly be sustained. Another reason for rotation of crops is, that some crops are so favorable to weeds, that if continued long upon the same bed, the labor of cultivating them is much increased, while, if raised but once in a place and followed by a cleaning crop, the weeds are easily kept under.

Besides, many crops planted continually in the same soil are more liable to be attacked by the insects which are the peculiar enemies of those plants. Again, different plants derive their principal nourishment from different depths of soil. Hence, deep-rooted plants should be succeeded by those whose roots extend but little below the surface—perennial plants by annuals, crops left for seed, or that are of a dry, solid texture, by those which are succulent and juicy.*

The following view of the principles and the practice of rotation is from the pen of Mr. J. J. Thomas, one of the most practical and reliable agricultural writers of the age:

"In the arrangement of a rotation, no additional expenditure or labor is necessary; it costs no more to cultivate crops which are made to succeed each other judiciously, than to cultivate those arranged in the worst manner possible. The former may bring triple the successful results of the latter—not by the expenditure of five hundred extra days in drawing manure, or five hundred dollars' worth of ditching, but simply by making a proper use of one's brains.

"It seems surprising, under the circumstances, that so small a number seize the golden prize thus completely placed within their reach—that there are so few, even of those reckoned good farmers, who pursue any thing like a systematic succession, to say nothing of such a rotation

* "Gardening for the South."

as shall accomplish its peculiarly beneficial results, namely, preservation of the riches of the soil, destruction of weeds, destruction of insects, and the most advantageous consumption by each successive crop of all the means for its growth within reach. As a consequence of this neglect, we see land overcropped with wheat, the soil worn out for this particular grain, and those troublesome weeds, chess and red-root, taking its place. We see pastures, left unplowed for a long series of years, become filled with 'buttercups' and ox-eye daisy. A disproportion of spring crops facilitates the spread of wild mustard, and among insects, grubs and wire-worms increase according to the cultivation that favors their labors. It appears to be but little understood how great is the assistance to clean cultivation afforded by a good rotation. In the best example of this sort we ever witnessed, every field of a symmetrically laid-out farm, except a wet meadow, was brought under a regular, unvarying system, scarcely a weed was ever to be seen, and we ascertained that the whole was accomplished with not one-third of the labor usually expended for the hand-dressing of hard crops."

He gives the following as a

GOOD METHOD OF ROTATION:

I. 1st year—Corn and roots, well manured.
 2d year—Wheat, sown with clover-seed; 15 lbs. an acre.
 3d year—Clover, one or more years, according to fertility and amount of manure at hand.

II. 1st year—Corn and roots, with all the manure.
 2d year—Barley and pease.
 3d year—Wheat, sown with clover.
 4th year—Clover, one or more years.

III. 1st year—Corn and roots, with all the manure.
 2d year—Barley.
 3d year—Wheat, sown with clover.
 4th year—Pasture.
 5th year—Meadow.
 6th year—Fallow.
 7th year—Wheat.
 8th year—Oats, sown with clover.
 9th year—Pasture or meadow.

"The number of the fields must correspond with the number of changes in each course; the first needing three fields to carry it out, the second four, the third nine. As each field contains a crop each, in the several successive stages of the course, the whole number of fields collectively comprise the entire series of crops every year. Thus, in the list above given, there are two fields of wheat growing at once, three of meadow and pasture, one of corn and roots, one of barley, one of oats, and one of summer fallow."

IV. DRAINING.

WATER may render land unproductive by covering it entirely or partially, forming lakes or bogs; or there may be an excess of moisture diffused through the soil and stagnating in it, by which the fibers of the roots of all plants which are not aquatic are injured, if not destroyed.

Draining is required generally under the following circumstances:

1. Where springs rise to the surface, and where there are no natural channels for the water to run off.

2. To drain land which is wet from its impervious nature, and where the evaporation is not sufficient to carry off all the water supplied by snow and rain.

TEN REASONS FOR UNDERDRAINING.

1. It prevents water which falls from resting on or near the surface, and renders the soil dry enough to be worked or plowed at all times.

2. By rendering the soil porous or spongy, it takes in water without flooding in time of rain, and gives it off again gradually in time of drouth.

3. By preventing adhesion and assisting pulverization, it allows the roots to pass freely through all parts of the soil.

4. By facilitating the mixture of manure through the pulverized portions, it greatly increases its value and effect.

5. It allows water falling on the surface to pass downward, carrying with it any fertilizing substances (as carbonic acid and ammonia) until they are arrested by the absorption of the soil.

6. It abstracts, in a similar manner, the heat contained in falling rains, thus warming the soil, the water discharged by drain-mouths being many degrees colder than ordinary rains.

7. The increased porosity of the soil renders it a more perfect non-conductor of heat, and the roots of plants are less injured by freezing in winter.

8. The same cause admits the entrance of air, facilitating the decomposition of enriching portions of the soil.

9. By admitting early plowing, crops may be sown early, and an increased amount reaped in consequence.

10. It economizes labor, by allowing the work to go on at all times without interruption from surplus water in spring, or from hard-baked soil in summer.*

Where and how to make Drains.—The old method of cutting drains at right angles, or obliquely with the descent of the ground, has been superseded by that of cutting them on a line with its descent, or up and down it.

Mr. Smith in his pamphlet thus refutes the idea that any drains should be cut across a declivity: "Drains drawn across a steep, cut the strata or layers of subsoil transversely; and as the stratification generally lies in sheets at an angle to the surface, it is plain that the water passing in or between the strata, immediately below the bottom of one drain, nearly comes to the surface before reaching the next lower drain. But as water seeks the lowest level in all directions, if the strata be cut longitudinally, by a drain directed down the steep, the water will fall into the drain at the intersecting point of each sheet or layer, on a

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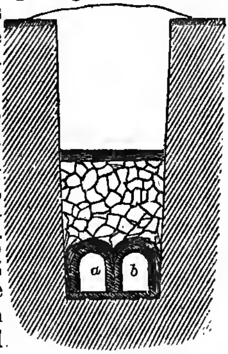
* "Annual Register."

level with the bottom of the drain, leaving one uniform depth of dry soil." Nor will these drains burst or flow as some assert, for if properly made, they will carry off the water so fast as to prevent any stoppage by mud or sand. It is the cross drains that are apt to be stopped.

Mr. Parkes's arguments are somewhat similar to those of Mr. Smith, on directly draining the water through the soil. Besides fertilizing the soil with the ammonia from the atmosphere, he considers it raises the temperature; and as the deeper we can get our land into this state the better, so therefore the deeper we get our drains, the more beneficially they will act; and although the cost of cutting each drain deep would be more, yet, as a more rapid flow is obtained, and a draught from a greater distance, it will be less expensive, as requiring fewer drains Even in stiff soils a thorough net-work of cracks and fissures speedily takes place from springage caused by joint action of the drains and superficial evaporation.

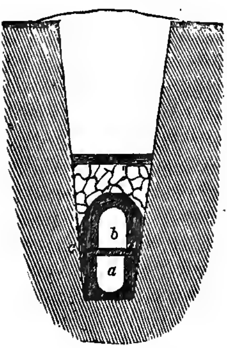


THE DOUBLE-TILED MAIN DRAIN.

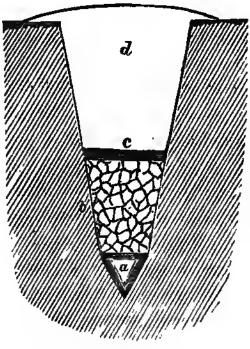
Dig your drains four feet deep, or as deep as the fall will let you, says Mr. Parkes; lay a small pipe at bottom, an inch one will often suffice, and fill up with the *most tenacious soil you can get*, for we do *not* want the water to run over the surface, and so sink directly over the drain, washing the surface land, and carrying grit into the drain; but we want it to sink where it falls, to aerate the land, and enter the drain either laterally or from below. And, says Mr. Smith, both collecting and spring drains should run *directly* down the declivity.

A main or large drain should be cut at right angles with the declivity into which all the smaller drains should discharge. They should all be connected at the upper end of the field with a drain of the same depth as the others, and running at right angles with them.

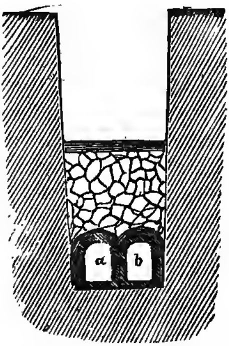
The accompanying illustrations represent the various kinds of drains. Their depths will vary from thirty to forty-eight inches, and their



THE INVERTED DOUBLE-TILED MAIN DRAIN.

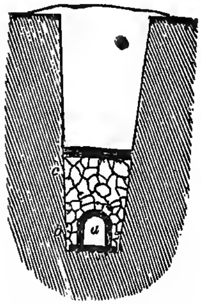


THE TRIANGULAR STONE DUCT.

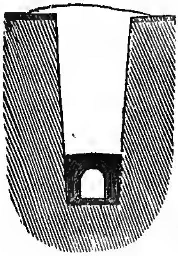


THE COUPLED STONE DUCT

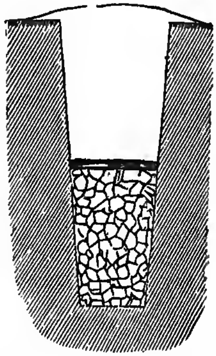
width from twelve to eighteen inches at the top, and from six to twelve at the bottom.



THE TILE AND STONE DRAIN.



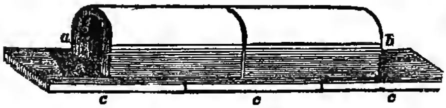
THE SMALL TILE DRAIN.



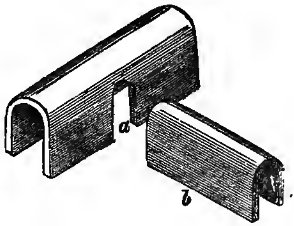
THE SMALL DRAIN FILLED WITH SMALL BROKEN STONES.

Advantages of Draining.—The following from the *Genesee Farmer* answers very clearly the question of the relative cost and profit of draining:

"If good naturally underdrained land can be obtained in your neighborhood for from fifteen dollars to twenty dollars per acre, it would not pay, in all probability, to expend thirty dollars per acre in underdraining low, wet, or springy land; but in all districts where land is worth fifty dollars per acre, nothing can pay better than to expend from twenty



THE DRAIN-TILES PROPERLY SET UPON TILE-SOLES.



THE JUNCTION OF A COMMON TILE WITH A MAIN-DRAIN ONE.

dollars to thirty dollars per acre in judicious underdraining. The labor of cultivation is much reduced, while the produce is generally increased one-half, and is not unfrequently doubled; *and it must be remembered that the increase is net profit.* If we get fifteen dollars' worth of wheat from one acre and twenty dollars' worth from the other, and the expense of cultivation is ten dollars in both cases, the *profit* from the one is twice as much as from the other. That judicious underdraining will increase the crops one-third, cannot be doubted by any one who has witnessed its effects. If it should double the crops, as it often does, the *profit* would be four-fold."

V. FENCES

Their Cost.—Fences are an immense tax upon the purse and industry of the farmer. The following view will direct attention to the vast amount of money invested in fences, and to the necessity of some cheaper and more durable material than that now employed in their construction.

"The fences in our state cost more than its railroads. Now, this huge amount of capital is, to all intents and purposes, dead. More, it is a decaying capital; annually a large amount of its depreciated stock must be replaced. These repairs cost immense sums of timber, time, and hard work. But the evil does not stop here; timber is decreasing in quantity and quality; for rails, posts, and stakes require a great deal, and that of the best kind, while our vast prairies have no timber at all, hardly, for fencing.

"And there are other evils connected with this expensive and stupid modern invention. Fences become the refuge of vermin and all manner of noxious weeds. Then, too, they act as natural and annual distributors of these weeds. The fence protects the weed till it is ripe, and then furnishes the seed to the first high winds of winter and spring.

"In addition to these objections to fences, we might mention that they occupy a great deal of ground.

"Now, what are their advantages? They keep cattle in their proper places, protecting the farmer against his own and other people's cattle. But what need is there for any body's cattle to run at large? There are laws now prohibiting some kinds of animals from running abroad; why not extend it to all? It is our impression that it would be much more economical to hire help to attend them in the field and in the stable than to pay for fences, fencing, and waste lands occupied by fences.

"We will append a few figures, from our own experience, in order to present to the farming community the importance of looking at this matter. We claim no special accuracy for our statistics, but they are, in the main, correct; and if they will call out from one or more of our farmers and agricultural professors the facts in the case, as they exist in our state, we shall feel that our object has been accomplished.

"Taking our own observations as a guide, these are the figures: Chestnut rails are worth six dollars per hundred; oak stakes, about three dollars per hundred. It takes fourteen rails and four stakes per rod for a worm fence; in round numbers, it costs one dollar per rod. This would be three hundred and twenty dollars per mile, and there were seven miles of fence, making two thousand two hundred and forty dollars for the fencing material. Now, add to this first cost the price of hauling, of setting up, or keeping in repair, of decay, and of the waste of land occupied. If you pay for bringing these rails to their proper places and putting them up, the first cost of material will be three thousand dollars. First cost of material and work, three thousand dollars; interest at six per cent., one hundred and eighty dollars; annual decay, six per cent., one hundred and eighty dollars; annual repairs, three per cent., ninety dollars; loss of land, five per cent., one hundred and fifty dollars. Annual cost, five hundred dollars.

"Could not this sum be better used?"*

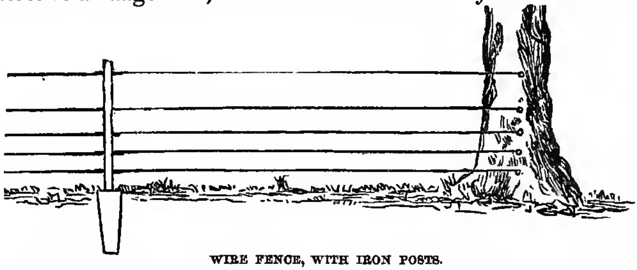
We suspect that in reference to large portions of the West, at least, the writer's closing question may be answered in the affirmative.

Mr. Biddle, a few years since, in an address before the Philadelphia Agricultural Society, stated that the cost of the fences in Pennsylvania amounted to one hundred millions of dollars, and their annual expense he estimated at ten millions of dollars. A distinguished writer on National Wealth says: "Strange as it may seem, the greatest investment in this country, the most costly production of human industry, is the common fences which inclose and divide the fields. No man dreams that when compared to the outlay of these unpretending monuments of human art, our cities and our towns, with all their wealth, are left far behind. In many places the fences have cost more than the fences and farms are worth. It is this enormous burden which keeps down the agricultural interest of this country, causing an untold expenditure, besides the loss of the land the fences occupy."

Wire Fences.—Stone and the common rail fences of the country are too well known to require special reference at our hands. But the various forms of wire, and live fences are deservedly attracting attention. In sections where timber and stone are scarce, they form a good substitute for them. The manufacture of wire fences is now carried on extensively, and the manufactured fence is sold at comparatively low prices.†

We copy from "The Farm," published by Fowler and Wells, the following illustrations and descriptions of the different styles of wire fences:

"The fences are made with horizontal wires, tightened by means of an effective arrangement, so that *the whole tension of the rod is obtained.*



WIRE FENCE, WITH IRON POSTS.

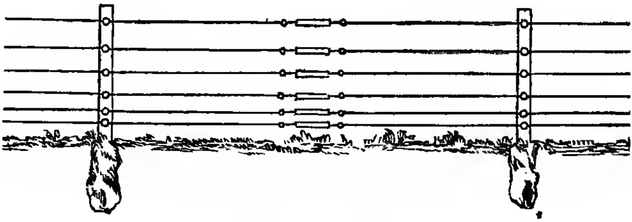
* "Ohio Farmer."

† As it may be useful to some of our readers, we give the prices per rod at which this fence may be procured (packed and shipped) at the warehouse of the New York Iron-Railing Company, in New York.

For cattle and horses,	3 wires,	with iron posts	and screws	....	$1 66
" " "	4 "	"	"	....	1 84
" " "	5 "	"	"	....	2 00
" Hogs, sheep, etc.	7 "	"	"	....	2 40
" Turkeys, etc.	10 "	"	"	....	3 00

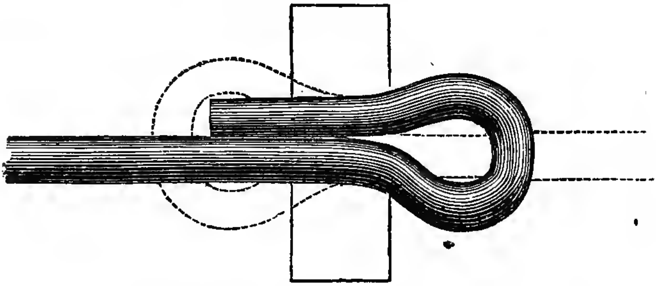
Each additional wire 20 cents per rod.

The posts are furnished with contrivances of different patterns for security in the ground. The size of the rods varies in accordance with the uses for which the fence is designed. No ordinary domestic animal will break through fences of considerably less than quarter-inch wrought wire, while still larger sizes may be used with the same facility, if required. The bright or hard wire is now generally used.



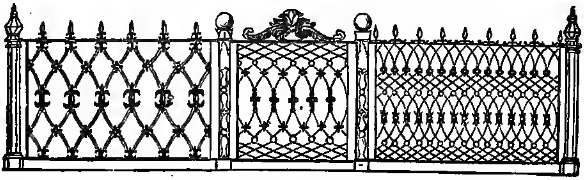
WIRE FENCE, WITH WOODEN POSTS.

"The accompanying cut exhibits the natural size of the wires most commonly used for farm fences, and shows the manner in which they



pass through and support the post and are supported by it. The following are the manufacturer's directions for putting up the fence:

"'It is absolutely necessary that the straining pillar, or starting post of wood or iron, at the extreme ends of the fence, should be perfectly firm, as the wires cannot otherwise be made tight. Commencing from a tree is recommended, if possible. Plant the posts twelve feet apart,



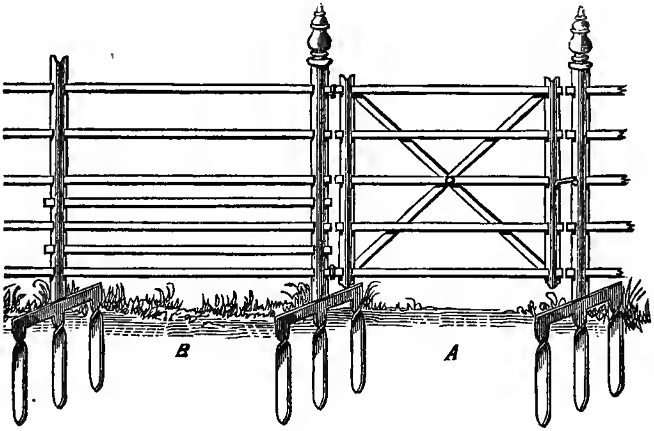
WIRE NETTING FENCE.

hook in the rails, and at the distance of one hundred and fifty feet place a screw on each wire. Place the next set of screws at the distance of three hundred feet, and so continue.'

"The wire-netting fence furnishes an admirable barrier against small animals, poultry, etc. It costs from one dollar and fifty cents to two dollars and seventy-five cents per rod, according to the height and the size of the wire and meshes.

"Another style of iron farm-fence is called the "Corrugated Flat-Rail Fence." It is in some respects preferable to the round rail or wire, being visible at a greater distance, and less liable to sagging.

"The hurdle, or light, movable fence, is formed in short panels, and firmly set in the ground by sharpened stakes at the end of each panel, and these are fastened together. This is a convenient addition to farms



WICKERSHAM'S CORRUGATED HURDLE FENCE.

where heavy green crops of clover, lucern, pease, or turnips are required to be fed off in successive lots, by sheep, swine, or cattle. It is variously constructed of wood or iron, and is much less expensive than might be supposed, 'Wickersham's Corrugated Hurdle Fence' being furnished by the Wire Railing Company at from two dollars and fifty cents to five dollars per rod, according to weight and quality."

Hedges, or Live Fences.—When hedges have been well made, and are kept in good order, nothing can surpass them, except well-built stone or brick walls, and even these are far less effectual in keeping out trespassers of every description.

Hedges are made of various kinds of shrubs and trees, trained so as to throw out numerous branches along the stem from the surface of the earth upward. This is done by judicious pruning when they are young. The head being cut off, and the side branches shortened, numerous smaller branches spring out, which are shortened in their turn, and form a very compact mass, consisting of the ends of stumps and branches pointing in every direction. Those shrubs, which are of a thorny nature are best adapted for hedges.

Plants for Hedges.—The various kinds of thorns are peculiarly adapted to form hedges, and they are consequently by far the most common plants of which a live hedge is formed. The Osage orange, pyracanth, the Cherokee, Michigan and single white Macartney roses, are all good for this purpose.

Many fears have been expressed that the Osage orange would not stand the cold of our northern winters; but this seems not to be so, when the plant is properly cultivated and trimmed. A forced and very rich cultivation, by inducing a very rapid growth, exposes the luxuriant shoots to be frozen and killed; and such is also the case with many other hardy plants. In Illinois, in 1856, thrifty Osage orange hedges were found surrounding apple orchards every tree of which had been killed by the severity of the previous winter.

Osage orange plants may be raised from seed, or bought at the nurseries for five or six dollars per thousand. The pyracanth, or evergreen thorn, we have Mr. Affleck's authority for stating, will make a hedge as effectual as the Osage orange, and, as it is an evergreen, is much the most desirable. The blossoms in spring are very showy, and it is covered in winter with bright-scarlet berries, and hence it is often called the burning bush. It grows freely from cuttings in sandy soil, but these cuttings should remain in the nursery-bed a year to become well rooted before use. Mr. Nelson gives the following directions for planting and trimming a hedge, which apply equally well to the Osage orange and pyracanth:

"**Planting.**—First dig a trench where the hedge is intended to be grown, two spades deep, throwing the surface to one, and the subsoil to another side; then throw the surface soil down on the bottom of the trench, and if it is very poor, add a little manure, or good surface earth, or even dry oak leaves. Autumn is by far the best time for transplanting, and can safely be done as soon as the leaves are dropped. Cut down the plants to within four inches above the roots before planting. Several authors recommend planting in double rows, but according to my experience in the management of hedges (and I have had a good deal in my life), I decidedly prefer single rows. Assort the plants in two parcels, those of large and those of small size, and lay the smaller ones aside for the richest ground. Stretch the line firmly, and place the plants in as straight a line as possible, one foot apart; fill up the trench with earth, leaving about two inches above ground; press the earth not too firmly, but water plentifully, and after that, level the whole nicely.

"**Trimming.**—It is perfectly useless to plant a hedge and leave it to be killed by weeds, or grow without trimming. A young hedge will require the same amount of labor as a row of Indian corn. The plants having been cut so much down, will, of course, start vigorously the ensuing spring. A good hedge ought never to be trimmed in any other than a conical shape. When trimmed in a conical shape, *every shoot will enjoy the full benefit of air, light, and moisture*, and by this simple and natural method, a hedge can be shorn into a *strong wall of verdure, so green and close from bottom to top, that even a sparrow cannot, without difficulty, pass through it.* In order to make a hedge so thick and impervious as above mentioned, it is necessary to go to work even in the first summer, with a pair of hedge-shears, pruning the young growth when about three months old, at the same time laying down some of the most vigorous shoots to fill up some vacant places near the ground; these shoots may be fastened to the ground with some hooked pegs; they may be considered as layers, will soon send up a number of sprouts, and make the hedge impenetrable for pigs, and nearly for rabbits. The young twigs may be trimmed in a wedge shape, not more than one foot high, and at the base six inches broad. The next season the hedge may be allowed to grow one foot higher, and three or four inches wider at the base. Thus the management must be continued until the hedge has attained the intended height, allowing an addition of four inches broader at the bottom, for every foot more in height. A hedge regularly trimmed twice a year, will, with the exception of the first years, when it requires a little more care than afterward, continue impenetrable for fifty or even one hundred years."

The Cherokee rose, by planting the cuttings by the side of a plank or wire fence, two feet apart, will grow up and cover it in a short time, and effectually repel man and beast; but it requires constant shortening in, or it is apt to die out at the bottom, and become unsightly, and is in all respects much inferior to the single white Macartney.

This is also an evergreen, and very easily grown from cuttings. It is very thorny, and of beautiful foliage. It never dies out at the bottom, whether pruned or not, and is very hardy and of luxuriant growth. The most satisfactory fence can be made with this, by setting good chestnut or cedar posts, eight feet apart, with their small ends charred, and planted about two and a half or three feet in the ground. Upon this, form the usual paling fence, or nail a good wide bottom-board, and finish the fence with stout wire, strained through holes in the posts. The wire fence may be four feet high. The roses should be rooted cuttings, and may be planted at first even eight feet apart, and by layering and training the bottom shoots, if the ground is kept in good order, in three years it will repel every intruder. It is better, where plants are abundant, to set them out four feet apart. This hedge requires less pruning than any other to keep it impenetrable. The holly would also make an efficient and beautiful hedge, were it not so difficult to transplant. My own hedge of Macartney rose, when three years old, trained on a common fence of rails and paling, forms a barrier perfectly secure, and very ornamental.

SECTION OF MODEL HEDGE.

Many think that it is advantageous to prune and cut down the young shoots every year, in order to excite them to throw out fresh ones in greater number. But this is an error by which the growth of the hedge is much retarded. The shoot should be allowed to grow to its full extent the first and second year; the root will then have struck deep into the ground; and in the third or fourth year the quicks may be cut down to a few inches. They will then send out several fresh and strong shoots, which may be cut and pruned to the height and width of the intended hedge.

VI. FARM IMPLEMENTS.

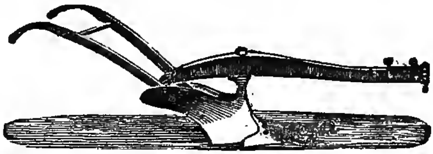
We shall not occupy space here or elsewhere with subjects already well and generally understood by those for whom this department of our work is intended. Hence all those implements—such as the plow, the harrow, the spade, the shovel, the hoe, the rake, the fork, the wagon, the cart, and the like—with which all farmers are as familiar as they are with the knife and fork which they know so well how to manage at the dinner-table, are here passed over, to allow us space for other things. Nevertheless, where there is an agricultural implement of great value, yet but little known and appreciated by the masses of the farming community, it is our legitimate design to bring it before them in a manner to promote its adoption. Such are the implements to which attention will now be directed.

An admirable plow, for turning under sward deeply, is the double Michigan. "It has two mould-boards. The forward, or small one, skims the surface, taking off a few inches of the top of the sod, and laying it in the bottom of the previous furrow; and the second, or large mould-board, turns up what is left, and completely buries the former. Three strong horses will draw this plow when of the smaller size, and will run a furrow eight or nine inches deep; but the larger-sized plow requires nearly double this force, and will cut a furrow a foot deep.

"The Michigan plow prepares sod ground in the best manner for planting corn, the mellow soil which is thrown on the sod being deep enough to allow a coat of manure to be buried afterward a few inches by means of a gang-plow.

"When the subsoil is of such a nature as not to enrich the top soil when thrown up and mixed with it, or when it is desirable to loosen up a deep bed of mellow earth to serve as a reservoir for moisture, the *subsoil plow* serves a valuable purpose. It is also useful for loosening the soil to allow the trench, or Michigan plow, to enter more fully to a greater depth.

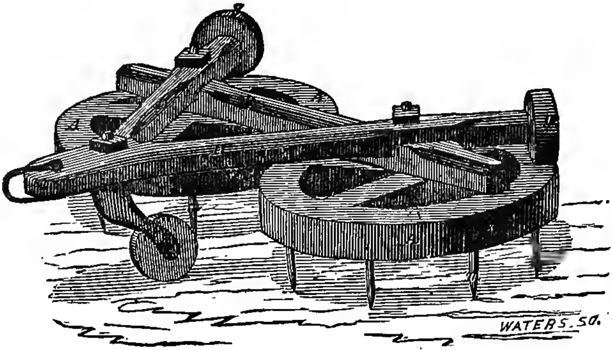
"The subsoil plow merely loosens the earth, but does not turn it up to the surface. It is made to follow in the furrow of a common plow. It runs much deeper than the trench plow, with the same force of team. Four horses attached to a strong plow, running in a furrow seven inches deep, will loosen the earth to a depth of fifteen to eighteen inches. The benefit of subsoiling depends essentially on keeping the ground well drained; for if the loosened earth is afterward allowed to become thoroughly soaked or flooded with water, it soon becomes compacted together again, and the operation proves of no permanent advantage. This is one fruitful source of failure."*



DOUBLE MOULD-BOARD PLOW.

The ridging or double mould-board plow is a very useful implement. It is used for opening drills to plant potatoes, corn, etc.; in plowing between narrow rows, in digging potatoes, etc. No farmer should be without it. It is a light one-horse plow. The side-hill, or swivel plow, is so constructed, that the mould-board is easily and instantly changed from one side to the other, which enables the plowman to perform the work horizontally upon hill sides, going back and forth on the same side, and turning all the furrow slices downward. This prevents the washing of the soil by heavy rains, to which all hill sides are more or less liable when plowed up and down the slope. Such a plow should be considered indispensable on all hill-side farms.

The Geddes harrow and the Hanford harrow, triangular in shape, are also excellent implements; and for light grounds, free from stones and other obstructions, the Scotch or square harrow serves its purpose admirably.



ROTARY HARROW.

The accompanying engraving represents a harrow recently patented by Samuel J. Orange, of Graysville, Ill. It involves the rotary principle, the rotation being produced by the pressure of the rollers *g g* upon the wheels *A A*. It has the important advantage, that while it secures the rotation of the wheels, it at the same time avoids side draught.

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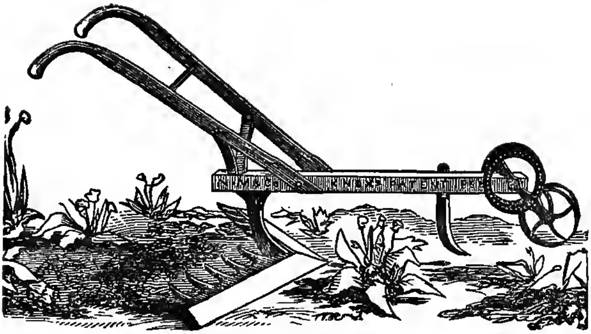
* J. J. Thomas.

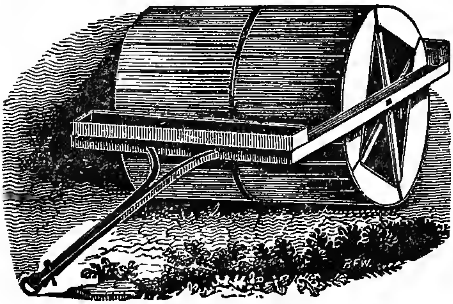


HORSE-HOE FOR COTTON.

The above is a representation of Knox's Horse-Hoe, adapted to the cultivation of cotton.

The Field-Roller.—Those who have become well acquainted with the use of the roller, would be unwilling to dispense with it; and some would say that a complete system of tillage, let the nature of the soil be what it may, cannot be carried on without it. It is now proposed to consider the several uses to which this instrument may be applied. On some soils, no doubt it may be more beneficial than on others; and of course some may be able to get along without its aid better than those differently situated.

The *first* object usually aimed at in the employment of this instrument, is to break those clods or indurated masses of earth which have resisted the action of the harrow; or, at all events, to bury them in the ground, so that at the next harrowing—which, when thus buried, they cannot well escape—they must, of necessity, be somewhat diminished in size. It is for this reason that in countries where the soil is very tenacious, and tillage very carefully conducted, it is the custom, even after the preparatory plowings, first to harrow, then to pass the roller over the ground, and then to harrow again. In such places, land not treated in this manner would be looked upon as being very badly prepared.



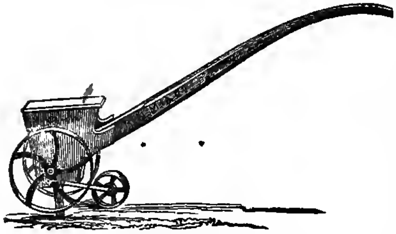
WOODEN FIELD-ROLLER.

The *second* object of rolling, is to give a somewhat greater degree of compactness to a soil which is too light and friable, and to unite its component parts. The roller is not employed for this purpose to so great an extent as it might be with advantage. Its action in this case being highly beneficial, particularly in counteracting the bad effects produced on extremely light soils by the too frequent use of the plow, and likewise in preventing the too rapid evaporation of the moisture contained in the soil. This application of the roller is particularly resorted to on the spongy soils of valleys. In such situations it cannot, indeed, be well dispensed with.

The *third* use to which the roller is applied, is to press down and make firm the ground about newly-sown seeds, and to cause the latter to adhere better to the soil. Sometimes, when very small seed is to be sown, it is found advantageous to pass the roller over the ground before the seed is sown, so as to level it thoroughly, and to facilitate more equal distribution of the seed than could otherwise take place. Where the ground has been thus leveled, those seeds which happen to fall together, separate from each other; and it is seldom that two are lying in one spot. The harrow is then passed over the ground; and this operation is followed by repeated rollings, which obliterate the lines drawn by the harrow. The roller may also be employed with advantage on soils which are neither particularly moist nor tenacious, after the harrow has been used to cover the seed. This operation serves to press the earth more closely into contact with the seed, which then germinates and springs up with much greater rapidity. The truth of this will be plainly seen by observing those parts which have escaped the action of the roller; for there the seed does not spring up so quickly as it does where the ground has been well pressed by this instrument. Probably, too, the pressure may, by the greater compactness which it gives to the soil, prevent any rays of light from penetrating, and thus interfering with the process of germination. Another advantage derived from this leveling of the soil by the roller is, that the harvest is greatly facilitated; for it enables the laborers to reap or mow closer to the ground—a point of great importance, especially as regards the pea and bean crops.

The *fourth* great use of the roller is to cover with mould, or press against or into the ground, the roots of those plants sown in the preceding autumn which have been detached by the frost. Soils rich in humus, such as those found in valleys, sometimes swell up in the spring to such a degree, that the roots of the plants contained in them are forced up. In such cases, if a fall of rain does not speedily occur, the roller is the only means of restoring them to their proper position. Accordingly, says a sensible writer, in no branch of husbandry is the roller more an implement of utility than in the cultivation of grass. It renders the soil compact and solid; it encourages the growth of the plants, by bringing the earth close to every part of the root; it assists in filling up and leveling any inequalities in the surface of the field, thereby preventing surface water from remaining stagnant, and eradicating the grass from particular spots; and it tends to hinder the drought from penetrating, which is an effect of the greatest importance. In fact, a grass field cannot too often be rolled; and it is not going too far to assert that the application of the roller in autumn to prepare the roots for resisting the winter frosts, and in spring to render them firm after the frosts, every year while the field remains in grass, will amply repay the expense.

The best plan for a roller is, that it be in two parts, each about three feet in length, and thirty inches in diameter; by this means, in turning, one will roll back while the other moves forward. The frame in which they are suspended may be made of good oak joist, four by six inches; holes being bored in the side-pieces to receive the gudgeons. If there are two cross-bars forward, perhaps twelve inches apart, good accommodations are furnished for the driver to ride; and if there are two behind the roller in the same manner, stones may be laid on to increase its weight. This, too, makes the frame strong, and not easily racked. For convenience in being sheltered, it may be put together by dovetail tenons and keys, so as to be easily taken apart. Then the rollers only require much space for protection against the weather during the season of winter. The author's is constructed in this manner. His roller consists of two-inch chestnut plank, three inches in width, the end pieces or heads being three-inch oak plank, and put together like a barrel, first nailed on, and then secured by hoops made of old wheel-tire. Complete, it cost about twenty dollars.



A SMALL HAND-DRILL.

They can, however, be made at a less expense. Instead of such framework cylinders, they can be made of smooth, round oak logs, the ends being sawed perpendicularly so as to revolve without obstruction. Iron gudgeons put into their centers make good axles. They ought to be not less than twenty or twenty-four inches in diameter. The cost of them might be less than half the cost of the others. Rollers are also made of solid stone, but for most purposes these would be too heavy. Others are made of cast-iron, hollow or solid, so as to give suitable weight.

It is necessary that a favorable period and weather, when the ground is sufficiently dry, should be chosen for rolling, as for harrowing. It is absolutely necessary that the humidity of the soil should not be so great as to cause it to stick to the instrument; for when that is the case, the operation is likely to prove more injurious than beneficial, not only to tenacious and clayey soils, but also to those which are lighter, inasmuch as it hardens the ground, and forms a crust, which is impervious to air and atmospheric action. On the other hand, however, it is not right to wait until the clods of tenacious land have, by the evaporation of all their moisture, become so hard as to render the action of the roller on them totally inefficacious.*

Subsoil-Plow.—Subsoil plowing has, when properly done, been attended with the most gratifying and sometimes astonishing results. Few persons have any idea of the depth to which roots descend in favorable situations. The fibrils of a wheat kernel have been found more than thirty inches below the surface; those of red clover, Indian corn, and Swedish turnip, five feet; and of sanfoin and lucern, from

* "Farmers' Every-Day Book."

twenty to thirty feet! And, long after they have become invisible to the naked eye, they can be detected by the microscope pushing themselves away from light. No one need be told the object of these subterranean journeys. It is the constant effort of the good cultivator to facilitate this wonderful operation of nature; he digs and trenches the soil to the depth of two or three feet, and finds himself repaid by a most luxuriant vegetation.

We have said that another benefit of subsoiling is that of admitting the sterile substratum to the meliorating influences of the atmosphere. This is one of the most important principles of husbandry. Experiment has shown that air contains a very large percentage of the constituents of vegetable growth. By subsoiling, these, or a large portion of them, will be absorbed by the loose earth, and carefully treasured up for the growing plant. And moreover, it is found that the free circulation of the air renders available, by certain chemical changes which we have not time to explain, many fertilizing gases that might otherwise lie dormant for centuries. Admitting that this circulation is in proportion to the lightness of the soil, it then follows that the benefit derived by the crop from this cause will be proportionably increased.

A thorough drainage is sometimes secured by subsoiling. We shall not state in this connection the respective advantages of draining wet and marshy land; we have only to inquire how far it may be effected by the use of the subsoil-plow. Where the share can break through a thin stratum of retentive clay, underlaid by one of a more porous character, so that the surface water may escape, the most beneficial results will probably follow. A barren and unpromising spot has thereby frequently become fertile and easy of cultivation. Sometimes, however, subsoiling has been of decided injury, in rousing the thirsty sand or gravel to absorb all the moisture and soluble manures of the surface soil. Land of this description ought to be kept in wood or permanent pasture, as under the most careful management it is ever ungrateful. And where the substratum of clay reaches far below the share, underdraining ought to be first employed. After this is done, the subsoil-plow may be used with profit.

Subsoiling secures a supply of heat and moisture for the plant. It is a well-known fact, that in time of drought the vegetation of a garden will be much more vigorous than that in the adjacent field. This is mainly owing to the greater looseness of the soil. A single instance in illustration will suffice. Mr. C. N. Bement, the distinguished agriculturist, some years since subsoiled several strips of a sandy knoll which he planted with Indian corn. In the dry summer that followed, the corn of those strips was green and flourishing, while that on the other portions of the lot was almost burned up with the heat; and at harvest, the difference in the yield was not less remarkable.

These are the *immediate* benefits that the farmer will derive from subsoiling, which has in many instances caused a gain in the crop of thirty or forty, to even more than fifty per cent. One thing more remains to be noticed in the present chapter—we mean the constant improvement of the subsoil. The minute particles of the surface and subsoils are gradually mixed together; the natural resources of the ground are wakened into life by the influence of the atmosphere; the thread-like web of roots with which it is filled decay when the plant dies or is removed; and in time, the sterile, unprofitable substratum becomes a valuable loam of great depth and fertility.*

The following list of the farm implements necessary for the proper cultivation of one hundred acres of arable land, has been prepared by Mr. J. J. Thomas:

2 Plows fitted for work	$20 00	1 Grain-shovel, or scoop-shovel	$1 25
1 Small plow do.	6 00	1 Pick	1 50
1 Cultivator, best kind	7 00	1 Mall and wedges	2 50
1 Drill-barrow	5 00	2 Axes	4 00
1 Roller	5 00	1 Hammer	50
1 Harrow	10 00	1 Wood-saw	1 00
1 Fanning-mill	20 00	1 Turnip-hook	75
1 Straw-cutter	15 00	1 Hay-knife	1 00
1 Root-slicer	8 00	2 Apple-ladders (for gathering)	1 50
1 Farm-wagon, with hay-rack, etc.	70 00	2 Large baskets	1 25
1 Ox-cart	50 00	2 Hand-baskets	50
1 Double farm harness	30 00	1 Tape-line (for laying off land)	2 00
1 Horse-cart	45 00	2 Sheep-shears	2 00
1 Horse-cart harness	18 00	1 Grindstone	3 00
1 Root-steamer, or boiler	20 00	1 Steel-yard, large, and one small	2 00
1 Shovel and one spade	2 50	1 Stable lantern	50
3 Steel-plate hoes	1 50	1 Curry-comb, and one brush	75
2 Dung-forks	2 00	1 Half-bushel measure	1 00
3 Hay-forks	2 25	20 Grain-bags	5 00
2 Hand-rakes	25	1 Ox-chain	3 00
1 Revolving horse-rake	8 00	1 Crow-bar	2 00
1 Grain-cradle	4 00	1 Sled and fixtures	30 00
2 Scythes	4 00		
1 Wheelbarrow	4 00	Total	$425 75
1 Pointed shovel	1 25		

VII. FARM CROPS.

In this chapter we shall confine our attention to the crops appropriate to field culture only, as we shall treat of garden products in a separate division of this work.

Indian Corn.—The corn crop of the United States is over five hundred millions of bushels annually, and its growth is largely on the increase. Its value is so great as to justify all judicious efforts to augment its culture. Its annual value is some three hundred millions of dollars.

Indian corn is now raised very extensively not only in America, but throughout a great part of Asia and Africa, and also in several countries of the South of Europe, as in Spain and Italy. In many of the provinces of France it forms almost exclusively the sustenance of the inhabitants. In some parts of America, two crops are obtained in a season; but as it is found to exhaust the soil very soon, it is usually

* "Farmers' Every-Day Book."

planted upon the same piece of ground only after an interval of five or six years. It succeeds best in soils which are light, dry, and rich.

The usual mode of planting is in little hillocks raised at intervals throughout the field, to each of which is allotted four or five grains. These last, after being dipped in water, will sprout in five or six days. Planting must be deferred till after the season of frost, as that will cut down the leaves, if not destroy the germ. In many countries, after flowering, the tops are cut off just above the ears, and considered excellent fodder for cattle. In other places, the entire stalk is allowed to remain till the grain is nearly ripe, when the whole is cut near the ground and put into stacks, each one designed to contain about a bushel of the ears. The juices in the lower parts of the stalk pass into the grain till it is fully ripened. The succeeding operation is to free the ears from the husks, which, with the stalks, are preserved for the feed of cattle in the succeeding season; and the grain upon the cobs is deposited in the granary. It is a controverted point among agriculturists whether it is best to cut off the tops of the stalks in the manner first described, or to adopt the latter mode. The former gives the best feed for cattle; but there is much additional labor. Those who practice it say also that there is more grain, and of a better quality. The advocates of the latter process affirm that the contrary is true, so far as the quantity of grain is at issue. We have, in different years, pursued both courses, but without making nice comparisons that would enable us to add our authority either way.

The green stems and leaves abound in nutritious matter for cattle, and in some countries it is cultivated solely for this purpose, especially after the early crops of other vegetables. When designed for this purpose, the seed should be sown broadcast, or very thickly in drills. The soil should be made rich; and the quantity of fodder frequently obtained is almost incredibly large. It may be cut in small parcels, and dealt out daily as needed. If given to cows, it will make their milk abundant. Perhaps it is the best and most economical feed for that purpose. Or it may be cured for winter use. In the latter case it should be thoroughly dried, and then well protected against moisture.

The grain, when well dried, will keep for several years, and preserve its power of germination. It is cooked in various ways, and forms a wholesome and substantial aliment. Domestic animals of every kind are also extremely fond of it. According to Count Rumford, it is, next to wheat, the most nutritious grain. It is considered as too stimulating for the common food of cattle, and is found to be more stimulating than any other kind of bread used by us. Mixed with rye-meal, it makes a bread extensively used in New England, and by those accustomed to it, much admired. Mixed with water only, it makes what is called hasty-pudding, a palatable article of food, and deemed worthy of being made the subject of a well-known poem by Joel Barlow. Ground coarse and boiled, it forms hominy, which is so great a favorite at the South. In the form of hulled corn, or samp, the whole grains furnish a dish not without friends.

The crop of 1848 was estimated at four hundred and seventy-one millions of bushels; that is, over one hundred and fifty bushels for each family. This, at the low price of sixty-five cents to the bushel, amounts to more than three hundred millions of dollars; from a single branch of agricultural investment and industry in a single year. However, its culture is so well understood, that it is superfluous to enter into a discussion. If a farmer desires to raise a large crop instead of a small one, let him learn the secret of doing it from neighbors who are already setting him the example. Give the land good tillage and ample supplies of manure, and the object will be reached.

We append a list of several large crops of corn:

Mr. Wadsworth, of Durham, Connecticut, in the year 1844, raised a crop on one quarter of an acre of ground at the rate of one hundred and fifty-one bushels and eighteen quarts of shelled corn per acre.

Mr. Paschall Morris, near Westchester, Pennsylvania, in 1845, produced ten acres which averaged one hundred and one bushels and three pecks per acre.

Mr. George W. Williams, of Bourbon county, Kentucky, in 1840, raised one hundred and fifty-nine and two-ninths bushels per acre.

Mr. Young, of Kentucky, in 1840, raised over one hundred and ninety bushels per acre.

Mr. J. P. Jones, of Sullivan county, New York, in 1849, raised over one hundred and ninety-five bushels of ears per acre, at a net profit of forty dollars twelve cents.

Mr. William H. Crawford, of the same county, and in the same year, raised one hundred and a quarter bushels of shelled corn per acre.

Mr. Rufus Beckwith, of Henrietta, New York, in 1844, raised one hundred and twenty-six bushels of shelled corn per acre.

Mr. Jabez Burroughs, of Chatauque county, New York, in 1846, obtained a premium for a crop of one hundred and fourteen bushels and thirty-two pounds of shelled corn per acre.

Mr. Stevens, of Hoboken, near New York city, raised over one hundred and eighteen bushels per acre.

Mr. B. Butler, of Chenango county, New York, in 1831, raised one hundred and forty bushels from one acre.

Mr. Leonard Hill, in 1823, received the premium from the Plymouth (Mass.) Agricultural Society, for a crop of one hundred and thirty-nine bushels of shelled corn per acre.

The Messrs. Pratt, of Eaton, New York, obtained, in 1822, from three acres, a crop of five hundred and seventeen and a half bushels, or one hundred and seventy-two bushels per acre; and in 1823, from four acres, six hundred and eighty bushels, or one hnndred and seventy bushels per acre.

The *Ohio Cultivator* states that John Loughry, of Adams county, raised one thousand five hundred bushels of shelled corn on eleven acres, or one hundred and thirty-six and a third bushels per acre for the whole field.

A number of years ago, Messrs. Amasa Turner and Seth Jefferson, of Mantua, Ohio, published a certificate that they had measured the shelled corn raised on one acre belonging to Mr. Seth Harmon, and found it to be one hundred and eight bushels and twenty-one quarts.

In 1835, Mr. Asabel Renwick, Pickaway county, Ohio, raised five thousand six hundred bushels on forty acres; that is, one hundred and forty bushels to the acre.

In 1837, a planter in Clarke county, Kentucky, on forty acres, raised three thousand eight hundred bushels.

In 1840, W. Ingalls, Oswego county, New York, raised one hundred and fifty-four bushels on an acre.

In 1841, B. Bradley, Bloomfield, New York, raised two hundred and thirty-two bushels on two acres.

In 1842, Samuel Phelps, Cayuga, New York, raised one hundred and twenty-two bushels on an acre.

In the same year, W. Wilcox, Saratoga, New York, raised one hundred and thirty-two bushels on an acre.

In 1840, J. Myers, Canton, Ohio, raised one thousand three hundred and fifty-two bushels on seven acres.

In 1823, Joseph Evans, Washington county, Pennsylvania, raised five hundred and eighty bushels on five acres.

In 1823, B. Bartlett, Eaton, New York, raised one hundred and seventy-four bushels on an acre.

In 1825, Mr. Wilmarth, Taunton, Massachusetts, raised one hundred and forty-two bushels on an acre.

In 1839, R. Lamprey, Moultonborough, New Hampshire, raised one hundred and thirty-one bushels on an acre.

In the same year, P. P. Pillsbury, Tuftonborough, New Hampshire, raised one hundred and thirty bushels on an acre.

> The corn-house fill'd, the harvest home,
> The invited neighbors to the husking come;
> A frolic scene, where work, and mirth, and play,
> Unite their charms, to chase the hours away.

Special Manures are plaster and ashes; and one of the best composts to promote its growth is made of equal parts of hen-manure, wood-ashes, and plaster, and about a gill to each hill, with the seed put into it, when planting.

Culture and Use of Wheat.—Wheat, whether we regard the important uses which it serves as the abundant source of food for the increasing population of this country, or the value of the produce to the farmer, of all the plants which are cultivated, there is none of more importance than wheat. It grows readily in almost every climate from the torrid to the frigid zones. A temperate climate, such as is best suited to the nature of man, seems to be its natural home. It has been so long cultivated, that where it appears to grow spontaneously, as in some uncultivated spots in the East, it is doubtful whether it be not the remains of wheat anciently cultivated there. It is an extremely hardy plant, and its vitality is such that it is not easily destroyed. Wheat has been known to be covered with the water of floods so long, that every other remnant of vegetation was destroyed; and yet, on the waters retiring, it has sprung up from the root and come to perfection. It has also been found in Egyptian tombs, and, if the statements are true which have appeared in the *Doncaster Gazette* and other publications, it has grown when planted.

The distinction between the winter and summer wheats is one which arises entirely from the season in which they have been usually sown; for they can readily be converted into each other by sowing earlier or later, and gradually accelerating or retarding their growths. The difference in color between red and white wheats is owing chiefly to the soil. White wheats gradually become darker and ultimately red in some stiff wet soils, and the red wheats lose their color and become first yellow and then white on rich, light, and mellow soils. It is remarkable that the grain sooner changes color than the chaff and straw—hence we have red wheats with white chaff, and white wheats with red chaff, which, on the foregoing principle, is readily accounted for. The chaff retains the original color when the skin of the grain has already changed to another. We state this on our own experience. The soil best adapted to the growth of wheat is a deep loam inclined to clay, with a dry subsoil. If this is not so naturally, it must be drained artificially, to insure good crops of wheat. In such a soil, wheat may be sown every third year, with proper intermediate crops. Formerly the preparation for a wheat crop was generally by a clean naked fallow, with a certain addition of manure, the remains of which were thought sufficient for a crop of barley or oats; after which the fallow recurred. It was soon found out that, by this means, a crop of wheat could never be forced beyond a certain average; for if more than the usual portion of manure was carried on the land, the wheat failed, by being laid before it arrived at maturity. Thus a limit appeared to have been set to its increase. New modes of cultivation have shown that this was not without its remedy, and that it was recent manuring which caused the wheat to lodge; but that an increased fertility, produced by judicious preparation, enabled the land to bear crops of wheat far superior to what it ever could before. Wheat requires a soil in which the organic matter is intimately mixed with the earthy ingredients; where it can have a firmer hold by its roots, and can at the same time strike the fibers of them downward as well as around, in search of food. When it meets with such a soil, and is deposited at a proper depth, it vegetates slowly, pushing to the surface one cylindrical filament, while numerous fibers strike into the soil from the seed. These supply the plant with regular nourishment, and in due time a knot is formed at the surface of the soil, from which several roots and stems branch out. This is called the tillering of the wheat. The new roots near the surface soon become the chief source of nourishment, and in a rich, compact soil, where there is room, numerous stems arise, forming a tuft, and each of these in time bears a large ear well filled with seeds; so that from a very moderate quantity of seed a great return is produced. The strong stems supporting each other are well able to resist the effect of storms and rains, which would lay weaker plants level with the ground. The effect of abundant manuring immediately before the seed is to produce too rapid a growth, weakening the straw, and increasing its quantity at the expense of the ear, which does not attain its proper development. This is called running to straw. All strong manures which contain many saline particles have this effect, which is corroborated by late experiments with saltpetre, nitrate of soda, and other saline compounds. They produce more straw and less corn, and hence are not found of the same use, when applied to crops which are cultivated for their seed, as they are on grasses.

A certain portion of nitrogen is essential to the production of good wheat, as that element enters into the composition of the gluten, which will be found to abound in proportion as nitrogen exists in the soil, or can be supplied from the atmosphere. The experiments of Liebig seem to show that the nitrogen of the atmosphere will not enter into the substance of plants, except in the form of ammonia, and hence the efficacy of manures has, of late, been estimated by the quantity of ammonia which they can produce. This theory, however, requires to be confirmed by experience before it is at once adopted without limitation. Decayed vegetable matter, or humus, seems essential in a good wheat soil, and it may, in the slow progress of its entire decomposition, when it is continually absorbing the oxygen of the air, have some chemical effect on the nitrogen also, so as to make it of use in the vegetation, whether by first forming ammonia or in any other way. Further experiments may perhaps throw a light on this subject. It is well known, however, that, provided a soil be compact, its fertility is very nearly proportioned to the quantity of humus which it contains, especially if there be calcareous earth or carbonate of lime in its composition. Lime has been often considered as the most efficacious manure for wheat, even more than dung. As long as there is organic matter in the soil, lime acts beneficially, and the richer the land which does not contain carbonate of lime already, the more powerful the effect of liming. But experience has proved that lime has little effect on poor soils, until they are first manured with animal and vegetable substances. To produce good wheat, then, the land should be gradually brought to the proper degree of fertility, by abundant manuring for preparatory crops, which will not suffer from an over-dose of dung, and will leave in the soil a sufficient quantity of humus, intimately blended with it, for a crop of wheat. Clover is a plant which will bear a considerable forcing, and so are beans, and both are an excellent preparation for wheat. The roots left in the ground from a good crop of either decay slowly, and thus furnish a regular supply of food for the wheat.

Choosing Seed.—The choosing of wheat for seed is a matter of great importance. Some farmers like to change their seed often; others sow the produce of their own land continually, and both seem persuaded that their method is the best. The fact is, that it is not always the finest wheat which makes the best seed; but it depends on the nature of the land on which it grew. Some soils are renowned far and wide for producing good seed, and it is well known that this seed degenerates in other soils, so that the original soil is resorted to for fresh seed.

Time of Sowing Winter Wheat.—It has been proven by careful experiments, that winter wheat may advantageously be sown much earlier than it usually is. It has been planted in central New York and in Indiana as early as the fourth of July, and withstood the winter well, producing a superior yield. It matured earlier and escaped the wheat midge. We invite experiments to test the effect of early sowing more fully, as, though occasional failures may result from smothering under deep snows, we are still inclined to the opinion that it will upon the whole be found to be advantageous.

Planting Wheat in Hills.—Experiments of cultivating wheat in hills have shown a remarkable increase of production, amounting to quadruple the ordinary amount, and the grain of superior quality. The subject is worthy of further attention, which it will doubtless receive at the hands of our enterprising farmers.

Diseases of Wheat.—While the wheat is growing it is exposed to various accidents, which it is often difficult to foresee, and more difficult to guard against. The smut and burnt-ear are diseases which may be generally prevented by a proper preparation of the seed before it is sown. Many corrosive substances have been recommended to steep the seed in, such as blue vitriol and arsenic, and those who have used these steeps place great confidence in them. It seems, however, that washing the seed well with plain water, or with salt and water, and afterward drying it with quick-lime, sufficiently destroys the germ of the smut to prevent its propagation. The most common steep is water in which so much salt has been dissolved as will enable it to float an egg. In this the seed may be left for twelve hours or more, and then spread on a floor and mixed with as much quick-lime as will absorb the moisture and allow it to be sown or drilled without the grains adhering to one another.

The ergot in wheat is an excrescence from the ear, like a small horn, into which the seed is transformed. It has a poisonous quality and a medicinal one. The cause of this monstrosity in the seed is not fully known. It is supposed to be caused by the puncture of some insect, introducing a virus which has entirely altered the functions of the germ, and made it produce this ergot instead of a healthy seed.

Mildew is often destructive to our staple grain crops. It originates in a very minute fungus, whose light seeds float in the air until, under peculiar circumstances favorable to their development, they multiply and expand with such rapidity as to damage or ruin the plants on which they fasten.

The leaves of a wheat-plant are covered with numerous small pores covering their whole surface, and also that of the stem. These pores, in damp weather, imbibe a great quantity of fluid matter, and as it is exactly this state of the atmosphere which is most conducive to the spread of fungi, we are led to infer it is then the mildew makes its first lodgment, and entering by the pores of the foliage or stems, soon spreads its blighting influence through the entire system of the plant.

As the first step towards the knowledge of a remedy is to be obtained by study of the disease, we must determine, as far as the power of reasoning and analogy will permit, in what way an attack of rust or mildew begins, and then from the nature of the predisposing causes and their effects, endeavor to deduce a remedy. In support of the opinion that the blight commences as described above, the fact of its first appearance being observable in small cavities directly under the pores, and not at the roots, as in the case of "smut," may be advanced with much force, for all recorded observations prove it; and further, that mildew is always most prevalent in continued damp weather, on undrained land, and on thick standing crops. It is true that, when the pores perform their natural offices, they pass off the superfluous moisture taken up by the roots; but when a dense atmosphere impedes their proper functions, this process of exhalation is stopped; and as the nature of all fluids is to soak in, it follows that the moisture of the atmosphere being heavier than that which should be given out from the plant, forces the latter back into the channels of the leaves by its greater weight, and, passing inward, enters the germs of the fungus, and produces the disease known by the term *mildew*.

We find, then, three causes at work, all conducive to the infection of the crop and spread of the disease, the state of the atmosphere, the condition of the soil, and last, though probably the most powerful, the crowded or over-luxuriant state of the crop. With the first we cannot contend; but the two latter causes are entirely under control. We can drain thoroughly and guard against rankness of vegetation.

It has been confidently asserted that an application of salt to the ground, immediately after seed-sowing, at the rate of six bushels to the acre, will generally prevent the ravages of fungi, from the soil to the blade, and its effect also in other respects, is highly promotive of the health, vigor, and consequent productiveness of the grain.

The Wheat-Midge is another enemy of the wheat crop. It deposits its eggs in the germ of the ear, the maggot living on the nutritive juices which otherwise would have formed the perfect grain. Its ravages have been, and still continue to be immense. Over whole states it threatens the entire destruction of the wheat crop, and the only means yet found of avoiding or mitigating its ravages have been in various ways to hasten the maturity of the crop. This can be done by a careful preparation of the ground, and by selecting those varieties which are the earliest to ripen. Some of the red varieties, particularly the Mediterranean, are now, for this cause, almost the only varieties sown.

The Hessian Fly is another destructive enemy of the wheat crop. It is not, however, so constant or extensive in its depredations as the midge, but, like the former, has so far evaded all efforts directed to its destruction. Wheat is subject to the attack of the Hessian fly, if sown too early in the fall, and again the ensuing spring, there being two annual swarms of the fly, early in May and September. When thus invaded, harrowing or rolling, by which the maggots or flies are displaced or driven off, is the only remedy of much avail. Occasionally other flies, and sometimes wheat worms, commit great depredation. There is no effectual remedy known against any of these marauders, beyond rolling, brushing, and harrowing.

The best preparatory crops for wheat are barley, oats, pease, and Indian corn. Naked fallows, once so common, have generally been superseded by preparatory crops, as saving a great amount of labor, and producing for that expended a better and quicker return.

It has been recommended that wheat be sown more deeply than it usually is, partly for its protection against its winter exposure. Featherstonhaugh, in his essay on the "Principles and Practice of Rural Economy" has given some curious facts favorable to this recommendation. He says a grain of wheat, when put into the ground at the depth of three inches, undergoes the following transformations.

"As soon as the farinaceous matter which envelops the frame of the young plant is softened into a milky state, a germ is pushed out, and at the bottom of that germ small roots soon follow. The roots are gathering strength, whilst the germ, by the aid of the milky fluid, is shooting upward; and when the milk is exhausted, the roots are in activity, and are collecting nourishment for the plant from the soil itself. This is analogous to the weaning of young animals, which are not abandoned by the mother till they can provide for themselves.

"But," says he, "the care of nature does not end here; when the germ has fairly got above the surface, and become a plant, a set of upper roots are thrown out, close to the surface of the ground, which search all the superficial parts of the soil with the same activity as the under roots search the lower parts; and that part of the germ which separates the two sets of roots is now become the channel through which the lower roots supply the plant with the nourishment they have collected. What an admirable contrivance to secure the prosperity of the plant! Two distinct sets of roots serve, in the first place, to fix the plant firmly in the ground, and to collect nourishment from every quarter. The upper roots are appositely situated to receive all the nourishment that comes naturally from the atmosphere, or artificially as manure, to the surface; and serve the further purpose of being the base of new stems, which are tillered up, and so greatly increase the productiveness of the plant. A bushel of wheat, weighing sixty-two pounds, contains five hundred and fifty thousand kernels." *Special manures*—lime, bone-dust, ashes, and salt.

The following table exhibits the composition of most of our cultivated crops, and a reference to it will show the relative quantities which each takes from the soil, and is a good guide in determining what to supply in the greatest abundance for the respective crops.

	Indian Corn.	Wheat.	Wheat Straw.	Rye.	Oats.	Potatoes.	Turnips.	Hay.
Carbonic acid	a trace	—	—	—	—	10·4	—	—
Sulphuric acid	.5	1.0	1.0	1.5	10.5	7.1	13.6	2.7
Phosphoric acid	49.2	47.0	3.1	47.3	43.8	11.3	7.6	6.0
Chlorine	0.3	a trace	0.6	—	0.3	2 7	3.5	2.6
Lime	0.1	2.9	8.5	2.9	4.9	1.8	13.6	22.9
Magnesia	17.5	15.9	5.0	10.1	9.9	5.4	5.3	5.7
Potash	23.2	29.5	7.2	32.8	27.2	51.5	42.0	18.2
Soda	3.8	a trace	0.3	4.4	27.2	a trace	5.2	2.3
Silica	0.9	1.3	67.6	0.2	2.7	8.6	7.9	37.9
Iron	0.1	a trace	1.0	0.8	0.4	0.5	1.3	1.7
Loss	4.5	2.4	5.7	—	0.3	0.7	—	—
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Rye: its Culture and Use.—Rye is extensively cultivated in Europe, especially in the Netherlands, where it is the chief grain from which the spirit called Hollands is distilled, which is flavored with juniper—in Dutch, *Genever* whence the name *Geneva*, and its contraction, Gin

The preparation of the land for rye is the same as for wheat, except that in very light soils no more plowings are required than will clear the ground of weeds. If rye is sown after harvest, one plowing only is usually given. It will thrive upon rich wheat soils as well as upon lighter, and, as it throws out numerous stems in rich land, it is the more profitable as fodder, although the crop of grain might not be so abundant when the plants are too much crowded.

All soils containing an excessive proportion of sand, and which are not too much exposed to humidity, will be found to bear better crops of rye than any other kind of grain. It exhausts land much less than wheat; and as it yields a larger quantity of straw than any other, it will, if the straw is reduced to manure, restore a larger portion of the nutriment which it has absorbed than any other.

Rye rises to a greater height than wheat, and produces a thinner stem, but a greater weight of straw. The straw is hard, wiry, and little valued for fodder, unless cut fine and mixed with ground grain. But it is used for manufacturing straw hats, and for collars for horses. It is also used in the making of brick, and is an excellent material for thatching cottages, barns, and sheds. When it is designed for hats, it should be sown very thick, cut green, and bleached by exposure to the air.

Rainy, damp, or very windy weather occurring about the flowering season has a pernicious influence on rye. Occasional showers do it no harm, even when they are tolerably frequent, provided that there are a few hours of warm, sunny weather between each; for during rain the rye closes up its valves, and when the sun afterward comes out, the anthers spring up so vigorously, that the pollen from the stamens covers the field like a thick cloud. But during continuous rains, the anthers undergo an alteration in the valves, and rot; or, at any rate, impregnation does not take place; or if it does, the embryo of the grain is putrefied and lost. It is thus that the disease termed the spur or ergot of rye is engendered, and that curious, blackish, violet-colored excrescence formed which is so well known, and of itself appears to be of no importance, but when swallowed in large quantities, and especially while fresh, has occasioned dangerous and mortal diseases in both men and animals.

Rye has been much used in the north of Europe and in this country for the distillation of intoxicating drinks. A more wicked perversion of an article designed for animal sustenance to the destruction of human life, cannot be adduced.

The extraordinary effects of the ergot of rye have made it the subject of experiments in medicine, and it has been found extremely useful in certain cases of protracted labor. It has consequently become an article of commerce as a drug, and imported from the continent. By an attentive observation of the circumstances which favor this disease in the rye, it might be profitable to cultivate the plant expressly for the ergot it produces. The seed which grows on the same ear with the ergot might be selected for seed, and a cold wet soil, with an ungenial aspect, might be chosen as most likely to perpetuate the disease. The ergot is sold by druggists at from two dollars and a half to five dollars per ounce, so that, if only a pound of ergot could be collected, it would be worth more than the produce in sound grain of an acre of the best land. At all events, it will well repay the trouble of picking out the ergot from the rye where it is infected, and it is easily discovered, before reaping, from its prominence and black color.

Special manures—ashes and bone-dust.

Culture and Use of Barley.—Barley is a grain too generally known to require a minute description. It is readily distinguished from other grain by its pointed extremities, and by the rough appearance of its outer skin, which is the corolla of the flower closely enveloping the seed, and, in most varieties, adhering strongly to it.

Of all the cultivated grains, it is perhaps that which comes to perfection in the greatest variety of climates, and is consequently found over the greatest extent of the habitable world. It bears the heat and drought of tropical regions, and ripens in the short summers of those which verge on the frigid zone.

Kinds of Barley.—The barley most commonly cultivated is that which contains two rows. It is almost universally sown in spring. The varieties produced by difference of soil and cultivation, as well as by seed occasionally brought from other countries, are innumerable. They have been divided by most agricultural writers into the early or *rath ripe* sorts, as they were called, and the late ripe, from the period of their being fit to reap. But this is a distinction which is not very accurate. It is well known that hot, gravelly soils bring any grain to perfection in less time than the stronger and colder soils, and that the produce acquires from the soil in which it grew a disposition to ripen earlier or later. This property it retains for a few seasons by some modification of its vegetating power, to which, for want of a better name, that of *habit* may be given, being analogous to the alterations produced on living animals by habit. Thus seed sown repeatedly in a light, dry soil becomes rath ripe, and that sown on the heavy, moist land late ripe, although originally the same. The rath ripe grain is always less heavy than the late ripe; and from these circumstances the experienced cultivator of barley chooses his seed from such land as may modify the habit produced by his own, giving him a crop with as heavy a grain as his soil can produce, and within a convenient period.

Time of Sowing.—The proper time for sowing barley is as early in the spring as the soil is in condition. The ground intended for barley should be plowed in autumn. In spring the cultivator only should be used in preparing it for the seed, and it should in all practicable cases be sown with the grain-drill. As a general rule, a depth of from one and a half to three inches, according to the nature of the soil, is most likely to enable the seed to sprout well, and give a sufficient hold of the land by the roots to avoid the danger of lodging. It is of consequence that all the seeds be deposited at a uniform depth, to insure their shoots rising at the same time; for where some rise earlier and some later, it is impossible to reap the whole in good order. Some of the ears will be too green, while others are shedding the seed from being too ripe. This is one reason why the drilled crops are, in general, so much more regular in their growth than the broadcast. After sowing barley, it is useful to pass a light roller over the land, across the stitches, if there are any, to press the earth on the seed, and prevent too great evaporation of the moisture.

This also is the best time to sow clover and grass seeds, if not done with the first rolling. The practice of sowing clover, rye-grass, or other seeds, with the barley is almost universal, and is considered as one of the great modern improvements in agriculture. There is no doubt a great advantage in having a profitable and improving crop to succeed the barley, without further tillage; and clover prepares the land admirably for wheat. Still, there are some doubts whether this is profitable in all cases. There are seasons when the clover materially injures the barley by its luxuriance; and in wet seasons the clover interferes with the drying of the crop. So far as the barley is concerned, the clover may be considered as a weed, which, like all other weeds, must take a part of the nourishment from the crop, and check its tillering.

Diseases.—The diseases to which barley is subject while growing are those which attack all other grain—the smut, the burnt-ear, blight, and mildew; but it is less liable to these than wheat. The greatest enemy is a wet harvest. It is so apt to germinate in wet weather after being cut, or the crop laid by the wind, that numbers of the ears appear in full vegetation, every grain having sprouted. It is then of little value, and even when this is checked by dry weather or in the kiln, the grain is so impaired as to be fit only to feed fowls and pigs. A strong plant of clover, by keeping the wet longer about the barley, often contributes to increase this evil, as has been hinted before.

The principal use of barley in this country, and wherever the climate does not permit the vine to thrive, and no wine is made, is to convert it into malt for brewing and distilling. The best and heaviest grain is chosen for this purpose, and, as it must have its germinating power unimpaired, the least discoloration, from rain or heating in the stack, renders it suspected, and consequently not so salable. It is, however, still fit for being ground into meal for feeding cattle and pigs.

Produce and Value.—The produce per acre on land well prepared is from thirty to fifty bushels, weighing from forty-five to fifty-five pounds per bushel, according to the quality. It is said to contain sixty-five per cent. of nutritive matter; wheat contains seventy-eight per cent. A bushel of barley, weighing fifty pounds, therefore contains about thirty-two pounds of nutriment; while a bushel of wheat, weighing sixty pounds, contains forty-seven. Oats, weighing thirty-two pounds, contain about nineteen pounds of nutritive substance, so that the comparative value of wheat, barley, and oats, in feeding farm stock may be represented thus: wheat, forty-seven; barley, thirty-two; oats, nineteen; Indian corn and barley contain, by weight, about an equal amount of nutriment; and one pound of oats, in nutritive value, is only equal to two pounds of good hay. These facts are important to all who would carefully estimate the relative economy of the different articles named in feeding or fattening animals.

Although the principal use of barley in this country and England is for beer, it may be applied to other purposes. It is said to be one of the best kinds of food for fattening hogs; giving the meat an improved flavor and consistency; causing it also to swell in the process of cooking. For the fattening of poultry it is highly recommended; also for food of horses, especially in the spring of the year, mixed with oats and soaked in water till it begins to vegetate. And when ground and mixed with other grain, it is advantageously used in fattening horned cattle. In Germany, barley is ground and formed into cakes for the feed of horses. In traveling in that country, it is no unusual thing to see the driver himself take a slice of the loaf. It is also used for cheap bread by the poorer classes. It is not deficient in nutriment, but is dark-colored and of strong taste. It is, moreover, of value for medicinal purposes. It is recommended, when made into gruel, being pleasant, emollient, and cooling; and the water in which it has been soaked to be mixed with nitre in fevers.

Culture and Use of Oats.—The great use of oats, and the ease with which they are raised on almost every kind of soil, from the heaviest loam to the lightest sand, have made them occupy a place in almost every rotation of crops. Before agriculture had been subjected to regular rules, the result of long experience, the land was often sown as long as any return could be obtained, before any means of recruiting it with manure were thought of; and the last crop which would return any increase of the seed was generally oats. After this, the land, no longer repaying the labor of the plowing and sowing, was abandoned till, by length of time and the decomposition of roots and weeds, some renewed fertility was produced. Of all the plants commonly cultivated in the field, oats seem to have the greatest power of drawing nourishment from the soil, and hence are justly considered as greatly exhausting the land. Some farmers on this account prefer buying all their oats in the market to raising them on their own land. Where the soil is well adapted to the growth of wheat and barley, which bear a better price, this may be a judicious plan; but, as a general rule, it is always more profitable to raise oats for home consumption than to trust to a fluctuating market. With proper management, a crop of oats may give as great a profit on the best land as any other crop, when it is considered that it requires less manure and produces an abundance of straw, which is very fit for the winter food of horses and cattle, especially when aided by roots or other succulent food.

To make a crop of oats profitable, some attention must be paid to the preparation of the soil and to free it from weeds; for to sow oats on a foul wheat or barley stubble slightly turned in by the plow, as is sometimes done, is the reverse of good husbandry.

On poor moist land oats are more profitable than barley. Clover and grass seeds may be sown among them with equal advantage, as they will seldom grow so high as to be laid and smother. In sowing oats, more seed is often used than of any other grain, because, although the plants tiller where they have room, the straw of the second shoots is weaker, and the grain is not ripe so soon as that of the principal stem; but when the plants rise close and thick there are no tillers, the main stem is stronger, and the corn is more plump and equal.

Varieties of Oats.—Loudon describes the following:

"The white or common oat is in most general cultivation in England and Scotland, and is known by its white husk and kernel.

"The black oat, known by its black husk, and cultivated on poor soils in the north of England and Scotland.

"The red oat, known by its brownish-red husk, thinner and more flexible stem, and firmly-attached grains. It is early, suffers little from winds, meals well, and suits windy situations, and a late climate.

"The Poland oat, known by its thick, white husk, awnless chaff, solitary grains, short, white kernel, and short, stiff straw. It requires a dry, warm soil, but is very prolific.

"The black Poland oat is one of the best varieties; it sometimes weighs fifty pounds to the bushel.

"The Friesland or Dutch oat has plump, thin-skinned, white grains, mostly double, and the large ones sometimes awned. It has longer straw than the Poland, but in other respects resembles it.

"The potato oat has large, plump, rather thick-skinned, white grains, double and treble, with longer straw than either of the two last. It is now almost the only kind raised in the north of England and south of Scotland, and brings a higher price in London than any other variety.

"The Georgian oat is a large-grained, remarkably profitable variety, and on rich soil, in good tilth, has produced more than any other variety.

"The Siberian or Tartarian is by some conceded a distinct species. The grains are black or brown, thin and small, and turned mostly to one side of the panicle, and the straw is coarse and reedy. It is little cultivated in England, but is found very suitable for poor soils and exposed situations.

"The winter oat is sown at the rate of two bushels per acre in October, the plants are luxuriant and tiller well, and afford good winter and spring pasture for ewes and lambs, and when these are shut out, it affords an ample crop of grain in August."

The imperial variety is the heaviest oat grown in the United States, and at the North is generally preferred to all others. At the South, the Egyptian, sown in autumn, is the only variety on which dependence can be placed. It is not very productive, though sound and hardy.

In the practice of the farm, it is good policy to reserve the light grains for the feeding of the horses, and the heavier for seed and for sale. The practice prevails in some places not to thrash oats to be used by horses kept on the farm where raised, but to be eaten with the straw, the latter being cut fine by a machine. This practice is a good one, provided the proper quantity can be given to each horse. Horses will masticate the grain better in the chaff than if taken into the mouth alone. Besides, the straw is saved, and thus used is reckoned a wholesome aliment. Possibly, however, too much time would be required in this way for the feeding of horses that are wanted for constant labor. In this case it is better to give them thrashed oats, mixed with hay cut fine. When hay is dear, it is often found economical to increase the quantity, and use less of hay. The calculation is easily made when it is known that one pound of oats is equal to two pounds of the best hay.

Special manures—Bone-dust, ashes, and common salt.

Culture and Use of Buckwheat.—The name of buckwheat is a corruption of the German *buch-weizen*, which signifies beech-wheat, from the resemblance of the seed to that of the beech-tree. It is called wheat, because, when ground, it produces a fine farina, which resembles that of wheat in appearance. It is not so well adapted to cold, wet soils as to warm sands; nor is it so certain a crop as oats or barley on lands which are suited to the growth of these grains. For countries where there are very poor light lands, with a hot, dry climate, unfavorable to the growth of oats, and not rich enough for barley, buckwheat is a great resource, and without it, many tracts of poor land would scarcely be capable of supporting a population. As a principal crop, therefore, it is confined to some parts of the south of France, and other countries similar in soil and situation. As a secondary and occasional crop, it often occurs in Switzerland, Germany, and especially in Flanders, where it enters as a regular part of their varied and complicated rotations.

When buckwheat is cultivated as a regular part of a rotation, it is generally after the land has been considerably exhausted by former grain crops, and manure cannot be had in sufficient abundance to recruit it. It will produce a better return than oats, and leave the land in a better state, especially in warm and dry seasons. On richer and better soils it may be occasionally a good substitute for barley, when the land cannot be properly cleaned and tilled sufficiently early in spring, for it allows a full month more to prepare the ground, and in this one month, if it be hot and dry, a good tillage may produce nearly all the advantage of a summer fallow.

The ripening of the grain is very unequal, for the plant is continually flowering and setting. We must, therefore, cut it at the time when the greatest quantity of grain is ripe. It sometimes happens that the first flowers do not set, or that they produce nothing but barren seeds, destitute of farina, while those that come out later yield better seed. But the grain will ripen, and even the flowers set, while the crop is lying on the ground, after cutting, especially if rain fall. This occurrence, therefore, is considered favorable. Extraordinary crops, amounting to twenty bushels per acre, are but very rarely obtained.

One of the purposes to which it has been applied from time immemorial, and for which, from the quickness with which it grows, it seems well adapted, is the plowing it down green, as a manure for the land Farmers who have made trial of this practice, speak favorably of its effects; and cases may, doubtless, be conceived where it may be beneficially adopted. But generally, where a good system of agriculture is established, and where a proper combination of the practice of tillage and feeding live-stock exists, a green crop, when raised, will be more advantageously applied to the feeding of animals in the first place, and then the manure, which the consumption of it produces. applied to the ground.

The product of buckwheat in the United States for 1847 has been estimated at twelve millions of bushels, or a little less, and more than half of the amount was raised in the states of Pennsylvania and New York. It is said that in Ohio the kernels have grown far larger than elsewhere known, and that the product upon the acre has been proportionably larger.

It is sown broadcast, at the rate of one bushel or one bushel and a half to the acre, at about the time, or a little before, the ripening of winter wheat. It is a good crop with which to sow grass seeds, as their growth is more certain than with other grain. A heavy roller should be passed over the soil after the harrowing is completed.

The Culture and Use of Potatoes.—The honor of first cultivating the potato in Ireland, where it has so long constituted the principal food of the peasantry, has been attributed to the grandfather of Sir Robert Southwell, president of the Royal Society of London, toward the close of the seventeenth century. Sir Robert's statement was to the effect that his ancestor had obtained some roots from Sir Walter Raleigh. The well-known story of Raleigh's having first planted the potato in his garden at Youghal, and of the disappointment of the gardener in autumn on tasting the apples of the "fine American fruit," and of his subsequent discovery of the tubers, when he was desired by his master to throw out "the useless weeds," is probably authentic also.

It was not, however, until after a considerable time that it became palatable, productive, and farinaceous, or admitted into the course of field husbandry. It was limited to the garden for at least a century and a half after it was first planted at Youghal, and it was not until 1732 cultivated as a field crop in Scotland. It appears (from the "General Report of Scotland") that in the year 1725–6, the few potato plants then existing in gardens about Edinburgh were left in the same spot of ground from year to year, as recommended by Evelyn. A few tubers were perhaps removed for use in the autumn, and the parent plants were well covered with litter, to save them from the winter's frost.

In order to obtain seed, properly so called, the potato-apple, when perfectly ripe, should be dried, and then disengaged from its seed by rubbing with the hand. The seed should be preserved in a dry place, in paper or cloth bags, until the middle of March or beginning of April, when it may be sown in wooden boxes or earthen pans, with a covering of less than half an inch of well pulverised earth. The vessels ought then to be placed in hotbeds of mild heat, such as is suited to the raising of half-hardy annuals. The plants, when an inch high, should be pricked out into other vessels, and placed in a temperature somewhat lower than before, to inure them to the external air, to which they should be exposed after the frosts have ceased. These plants should be put out in drills sixteen inches apart, and with the interval of six inches between the plants in the rows. They will produce tubers in the first year, and these may be planted in the following season in the ordinary way.

The germination of the sets may be accelerated by a little management previously to their being planted, by laying them on a floor, sprinkling them with water until they bud, and then covering them with finely-sifted mould. If this be done in March, or from four to five weeks before the soil can be profitably cultivated, the sets with strong shoots may be taken up at that time, with as much earth as possible adhering to them, and transferred to where they are to grow.

Culture of Potatoes in the Southern States.—"In Mississippi and parts adjacent, the best common potatoes that we have ever seen were planted in November and December. Plow the ground deep, not less than ten inches—twenty would be better—open a deep furrow and fill it with good stable manure, well trampled down; cover it slightly with earth and lay the tubers on ten or twelve inches apart, then cover with a heavy furrow turned up from each side and smoothed down with a hoe. Average the furrows so that the water will not stand, and you will have a good crop."*

Value of the Potato.—The estimated product of potatoes in the United States for 1847, according to the report of the Commissioner of Patents, (p. 558), was 100,950,000 bushels, which, at twenty cents per bushel, was valued at $20,190,000, being, after wheat, Indian corn, oats, beans, and pease, the sixth in value.

To guard against the Potato Disease.—Plant on greensward soil, for the following reasons:

1. It affords, as it gradually decomposes, the most natural nourishment of the potato.

2. It is a slow conductor of heat, and so preserves an equable temperature about the root.

3. It preserves a moisture in the soil.

4. It forms a loose mass in which the tubers may readily form. Coarse manure subserves all these purposes, but in a much less perfect and economical manner, and while the potato is weak, in a manner much less safe.

Mode of securing the best Tubers for Seed.—Besides the frequent renewal of the potato from the seed-ball, a thing never long neglected, something may be done to *continue* the vigor of existing valuable varieties.

1. Let every cultivator plant a small plat for seed in good medium soil and fair exposure. Thus he will be likely to secure tubers of the highest health.

2. For ordinary winter stores such seed may be planted in somewhat richer soil. The forcing of it by a richer cultivation, for one season, will not be likely to enfeeble it sufficiently to disease it much, while the crop may be large.

3. Another portion of seed may be planted in very rich soil, where it may yield a very heavy crop for early market; but it will be likely to be sold and eaten before any morbid tendencies, which such a course of cultivation might produce, would be likely to develop. Neither of these last should be used for seed.

Influence of Wide Planting.—I noticed a fact during the past season which though new is exceedingly natural. Single hills, single rows, rows planted widely apart, hills at the end of rows and on the windward side, withstand disease better than those otherwise situated. Hence I infer that wide planting and open airy positions are both favorable to the health of the potato, by securing a freer access of sun and air, and thereby promoting a more healthful action of the foliage, and of course a more healthful elaboration. Numerous cases were noticed near the

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* "American Agriculturist."

close of the season, in which potatoes, situated as above described, exhibited green foliage, while all around them were dead. Has this fact any bearing on discussions on this subject?

The general improvableness of the potato by reproduction being admitted, what is the probability of success in a given case? The answer undoubtedly will be, that success will be in proportion to the elevated point from which you start. There will always be a tendency in like to produce like.

1. Suppose you start with a foreign sort whose first and leading quality is hardness; one whose flesh perhaps is yellow and heavy, and whose maturity is late. The seed-balls of such a variety will produce a family of seedlings the most of which will be hardy, though few will be highly improved in quality of flesh and time of maturity. They will need, therefore, a second or third reproduction.

2. Suppose you start with seed-balls from a home variety which possesses fine shape, color, and white and dry flesh, but is deficient in hardiness. The result from such seed-balls will probably be a family of seedlings which will resemble the parents in all leading qualities, and some few of which will moreover exhibit a fair improvement in hardiness, though still needing a second or third reproduction from the seed-ball.

3. Suppose the case of a variety, either imported or long cultivated at home—one that possesses a combination of all good qualities. Here it should be remembered that these qualities, particularly hardiness, will one day wear out. It should therefore be reproduced from the seed-balls, even although you continue to cultivate the original variety for many years afterward. In the case of a family of seedlings from such a variety, you may expect to get proportionably a very large number of seedlings of good quality the first time you sow seed.*

A correspondent of the "Agriculturist" makes the following remarks on the renovation of the potato, as it is termed. He says, "A potato that will not produce more than one hundred and fifty bushels to the acre is not worth the farmer's attention, much less if it be in a diseased state; and, in my opinion, the old potato is not worth redemption from disease, even if it could be effected. The world, I conceive, is in immediate want of new varieties; *new* in their origin from the seed, *new* in quality and productiveness. Such potatoes have been produced, and are in advance of the old crop in every important particular. They are cultivated by several persons in Europe as well as in this country. A gentleman in Germany, near Hamburgh, says he practiced raising potatoes from seed for fifteen years, and obtained splendid varieties, which are not attacked with the disease. I have practiced the same method for seven, and know, by my own experiments and observations, that it is the true course to pursue.

"I am now making preparations for the culture of about thirty acres the ensuing summer for seedling tubers and the seed of seedlings. The latter is in the fifth successive year from the old potato. I expect my seedling tubers will produce four hundred or five hundred bushels to

* Transactions N. Y. S. A. S.

the acre; and from the seed of my seedlings I hope to obtain at least three hundred bushels per acre, the tubers weighing ten ounces each. I think this estimate may be a safe one, though much will depend upon the season. The summer droughts, if severe, operate unfavorably to the potato crop.

The coming season I intend to gather a large quantity of seed from the balls of my seedling tubers, which grow on the vines in great abundance, while on many of the old varieties they have totally disappeared. Half an ounce of seed will plant a quarter of an acre. Every year's experiment brings both the tuber and its seed in advance of its former condition.

It has been said by reliable experimenters, that equal quantities of quick-lime, plaster, and ashes dropped upon the seed in the hill, is a great preventive of disease. Use a small handful to a hill. Analysis of the plant shows these substances to be also the best special manure.

The Sweet Potato—*Cultivation South.*

The following is the plan of culture recommended by Mr. White in his "Gardening for the South." The sweet potato likes a rich, sandy loam, perfectly friable, and, as indicated by analysis, abounding in potash. The soil should be well enriched. They do well on lands freshly reclaimed from the forests.

"The Spanish potatoes are generally planted where they are to remain, like the Irish potato, whole, or cut up into sets. But both these may, and the yams must be propagated by slips, as they grow larger and yield more abundantly. To raise slips, select a sunny spot, sheltered by fences or buildings, and lay it off in beds, four feet wide, with alleys of the same width between them; slope the beds a little toward the sun; dig them well, and add plenty of well-decomposed manure, if not already rich. Do this the last of Febrnary, or early in March. Choose large, smooth, and healthy-looking potatoes, and lay them regularly over the bed an inch or two apart, and cover them about three or four inches with soil from the alleys; rake the beds smooth, and it is done. In large operations, ten bushels of potatoes should be bedded for every acre of ground.

"While the slips are sprouting, prepare your ground to receive them. It should be rich, or made so with well-rotted manure, and thoroughly and deeply broken up with the plow or spade. Lay it off just before the slips are ready, which will begin to be about the 15th of April, in low *horizontal* ridges or beds, the crowns of which are three and a half feet asunder, and about six inches high, on which plant out the slips with a dibble, eighteen inches apart, one plant in a place. Choose for this operation such a day as you would for cabbage plants, or do it in the evening. The sweet potato is readily transplanted, and if holes are dug in the mellow bed, deep enough to admit the plant, and the slips set upright therein, have the earth washed in about their roots by pouring water upon them from the open spout of a water-pot, finishing the operation by covering over with a coat of dry mellow earth, brought up and pressed pretty closely about the slips, to keep the moistened earth from baking. Very few will *die*, even if they are set out at mid-day; but as the plants would be checked, a cloudy day, or just at night, should be selected for the operation. This is an excellent mode of transplanting all plants, and is of great use both in the vegetable and flower garden. If the slips are not washed in as above, when taken up in dry weather, it is of great advantage to grout them, as well as all other plants you wish to transplant. This is done by immersing the roots in water thickened with rich earth. It refreshes the slips, and gives them a thin coating of earth as a protection against the atmosphere. Draw the slips when about three or four inches high, by placing the left hand on the bed near the sprout to steady the root, and prevent its being pulled up with the sprout, which is loosened with the right hand, taking care not to disturb the fibrous roots of the mother potato, for this continues to afford a succession of slips which may be successfully transplanted until the 1st of July. After the piece is planted go over it again in a few days, to plant over any place where the slips may have failed. As soon as the ground gets a little weedy, scrape it over, loosening the earth and covering up the weeds, but be careful not to injure the young slips. Faithful cultivation and frequent moving the soil are as beneficial to this crop as to any other. At one of the hoeings just before being laid by, the ground should be deeply moved with the plow or spade, but not too close to the plants. They should be laid by before the plants run a great deal, after which they should be undisturbed. Be careful not to cover the vines, but if they become attached to the soil, loosen them up from it, so that the vigor of the plants may be thrown into the roots, and not into the running vines. Make the hills large and broad, not pointed. In hoeing, draw the vines carefully over toward you, while you draw up the earth and cover the weeds; then lay them carefully back, and finish the other side in the same manner. At this time it is an excellent plan to fill the spaces between the rows with leaves and litter while the ground is wet, to retain the moisture. After the vines have covered the ground too much to use the hoe, any large weeds that appear should be pulled up by hand."

Cultivation at the North.—The following method is recommended by Mr. Bridgeman, proprietor of the Astoria Nurseries. The plan recommended we know to be satisfactorily practised by a large number of farmers and gardeners in central and western New York, and is of course equally applicable to all localities, east or west, having a similar climate and soil:

"Sweet potatoes are grown to great perfection in the Southern States, and may be raised in the vicinity of New York by means of a moderate hot-bed, in which they should be planted whole, early in April, three or four inches deep, and about the same distance apart. In about a month they will throw up sprouts. When these are three inches above ground, part them off from the potato, which, if suffered to remain, will produce more sprouts for a successive planting; transplant them into rich, light soil, in rows four feet apart, and the plants about a foot apart in the rows, or in hills four feet apart. Keep them clear of weeds until the vines begin to cover the ground, after which they will grow freely. In sandy ground, it is well to put a shovelful of rotten manure to each plant.

"A moderate hot-bed, five feet square, put down early in the month of April, with half a peck of good sound sweet potatoes placed therein, will produce a succession of sprouts in May and June, which, if planted and managed as directed, will yield about fifteen bushels of good roots."

Culture and Use of Tobacco.—The cultivation of tobacco is most extensively carried on in the United States. It requires considerable heat to come to perfection; but with care and attention, and by treating it as an exotic, it may be very successfully cultivated in much colder climates. The least frost injures it; but this is the case with many plants, which are nevertheless successfully cultivated in the northern part of Europe. The seeds of the tobacco plant must be sown in a prepared seed-bed, and be carefully protected from the least frost; for which purpose straw and fern are used, as is done by the market-gardeners who raise early culinary vegetables. When once the danger of spring frosts is over, they may be safely transplanted; and if the ground has been duly prepared, they will arrive at maturity before the frosts of autumn, as is the case with potatoes, buckwheat, and many other plants which are natives of warmer climates. The seed is sown very early in spring, in seed-beds, from which they are to be transplanted, when all danger from frost is over. Four or six leaves should be on the plant. If more, the lowest may be pinched off. If the ground was sufficiently moist, and no great heat or strong sunshine wither the plants, they will scarcely appear to have suffered from the removal; those which die, as must often be the case, are replaced by others left in the seed-bed for that purpose. Great attention must be paid to the beds all the time the tobacco is growing. Weeds must be carefully eradicated, and the earth repeatedly stirred between the plants with hoes and narrow spades to accelerate the growth. When the leaves acquire a certain size, the lower leaves should be pinched off, to increase the bulk of the upper; for the former are apt to wither before the latter have acquired their full growth. A fine tobacco plant should have from eight to twelve large succulent leaves, and a stem from three to six feet high. The top should then be pinched off to prevent its running and drawing the sap from the leaves. Every lateral shoot should be carefully pinched off as soon as it appears, to prevent branching. A few plants are left for seed, and of these the heads are allowed to shoot the full length. The seeds are so small and so numerous on a plant, that a few plants produce a sufficiency of seed for the next crop. The plantations of tobacco are continually examined, and every leaf injured by insects or otherwise is pulled off.

Tobacco takes about four months from the time of planting to come to perfection; that is, from May to September, when the leaves are gathered before there is any danger from frost; one single white frost would spoil the whole crop and cause it to rot. As soon as the color of the leaves becomes of a paler green inclined to yellow, they are fit to be gathered; they then begin to droop, and emit a stronger odor, and they feel rough and somewhat brittle to the touch. When the dew is evaporated and the sun shines, the leaves may be most advantageously gathered, which is done by cutting down the plant close to the ground, or even a little under the surface. They are left on the ground to dry till the evening, taking care to turn them often, that they may dry equally and more rapidly. They are housed before the evening dew falls, which would injure them, and laid up under cover in heaps to sweat during the night; and some mats are thrown over the heaps to keep in the heat. If they are very full of juice, they are sometimes carried out again the next day to dry in the sun; but most commonly they are left to sweat for three or four days, and then moved and hung up to dry in sheds or buildings made for the purpose, like those in which paper is dried in the paper-mills, which allow a thorough draught of air but keep out the rain. Every tobacco plantation has such buildings proportioned to the extent of the cultivation. The floors are most commonly only the soil on which they stand; but it is much better if they are boarded, because on the earth the plants are apt to be soiled, which injures the quality of the tobacco. In some places the leaves are now stripped off the stems and strung on packthread to hang them up to dry; in others, the whole plant is hung on pegs placed in rows at regular distances, and fixed on laths which run across the building. All that is required is to place as many plants as possible without their being so near as to prevent the circulation of the air between them. When the plants are quite dry, they are removed in moist or foggy weather; for if the air is very dry, the leaves would fall to dust. They are laid in heaps on hurdles and covered over, that they may sweat again, which they do but slowly. The heaps are carefully examined from time to time to see that they do not heat too much; and, according to the season and the nature of the plants, whether more or less filled with sap, they remain so a week or a fortnight. This part of the process requires much attention and experience; for whether they do not heat to the proper degree or too much, in either case the quality is impaired. An experienced tobacco-grower will ascertain the proper degree of heat better with his hand than the ablest chemist could do with his thermometer. If the leaves were not stripped off at first, which is not the most common practice, they are taken off now, when the proper fermentation is completed, and sorted; those which grow on the top of the stem, in the middle, and at the bottom, are laid separately, as being of different qualities. They are tied together in bundles of ten or twelve leaves, and again dried carefully, when they are ranged in casks horizontally, and pressed in by means of a round board, by lever, or screw, as soon as a certain quantity has been laid in; the pressure is equal to that of a weight of several tons. This is essential to the safe transportation of the tobacco, and it is thus that the great bulk of it arrives from the places where its cultivation is most extensive, as in America.

The finest tobacco, however, is made into rolls, which, from their shape, are called *carrots*. The leaves are placed together by large handfuls, and wound very tightly round by strips of fibrous wood or strong grass, at a time when the air is somewhat moist; they partially consolidate, and require only to be rasped to make the finest and most genuine snuff, or rappee, as it is called. The snuffs commonly sold, however, are manufactured and prepared in a much more complicated manner.

The refuse stems of the tobacco are sometimes burned; but it is best to let them rot in the ground, where they are converted into good manure for the next crop. From the high state of cultivation of the land, it is left very rich for any other crop after the tobacco; but as this is quite a garden cultivation, the tobacco recurs very soon on the same ground; the abundant manuring and deep trenching prevent any bad effects from this frequent recurrence.

"Tobacco enters largely into our foreign exchanges, being second only to cotton on the list of our agricultural exports. There is no nation with which we trade which does not use tobacco: while in several European countries it is a government monopoly, and one of the chief articles from which revenue is derived. In several States of the Union it constitutes the chief staple article of agriculture, and its producers are large consumers of the ordinary products of the farm and dairy of other states; while in some of the northern and northwestern states its culture has been introduced as even more profitable than the usual agricultural industry of our farmers.

"But we not only export tobacco, we are also importers of the article to a large amount for our own consumption. It becomes an appropriate subject of inquiry, therefore, whether our soil and climate are not adapted to the production of those superior qualities which we now import, as well as those in the production of which we excel other portions of the world; and the question may also arise, whether our qualities of tobacco may not be improved so as to equal those now imported from the principal West India Islands?"*

Cotton: its Culture and Use.—The annual production of cotton in the United States is now over one thousand million pounds, and its annual value not far from one hundred and fifty million dollars. Cotton is also cultivated in the East and West Indies, in North and South America, in Egypt, and indeed in most parts of the civilized world where the climate is sufficiently warm. Considering its value, it is surprising that it is even no more cultivated than it is, especially as the process is so simple and suitable localities so abundant. It is an annual, and if permitted to retain all its vegetable developments, attains a considerable height. It has leaves of a bright green color, marked with brownish veins, and each divided into five lobes. The flowers have only one petal in five segments, with a short tube, and are white or of a pale yellow color, with five red spots at the bottom.

In the cotton plantations the ground is regularly laid out, and the holes are made for the seeds at the distance of twelve to thirty-six inches apart, according to the richness of the soil. In each of these several seeds are dropped, though all are not suffered to grow, the weaker ones being pulled up as soon as the planter can discover which will thrive the best, so that only two or three are left in each spot. As these grow they are pruned so as to yield the greatest supposable amount of fruit, as cotton is called. To do this in the best manner experience is required, as in the culture of grapes or any other fruit.

The cotton pods are somewhat triangular in shape, and have each

* New York Ag. Transactions. Senator Douglass's Address.

three cells. These, when ripe, burst open, and disclose their snow-white and yellowish contents, in the midst of which are contained the seeds, in shape resembling the seeds of grapes, but larger. The cotton, thus exposed to view on the bursting of the pods, appears like snow-balls. The cotton-fields of the South, when fully in a flourishing state, exhibit an appearance which cannot fail to delight the lovers of natural scenery. As far as the eye can reach may be seen a combined assemblage of vegetable beauty, and undulating like the waves of a quiet ocean. Amidst the green foliage all the varied hues of the flowers are constantly changing their reflections almost like the presentations of the revolving kaleidoscope. Scarcely does the spectator know at which moment he is most enraptured. He may assume and occupy some point of observation for weeks, but the scene is always new; each day exhibiting new tints in this waving mass of leaves and flowers. One cannot be wearied in looking at it. If in a measure monotonous, it is like the monotony of the western prairie, with its thousands of natural embellishments, in the period of summer; or like the monotony of a clear midnight sky, on which one might gaze forever—indeed bewildered but never wearied.

The ground cannot be too well prepared for Cotton. If it had rested one year, it should be broken flush as early in the previous fall as possible, and spaded just before planting. If it has rested two years, or been planted the preceding year, let it be listed as early as it can be done, and two furrows thrown upon the list. Immediately upon planting, let two more furrows be thrown up and balk broken out completely.

Cotton should be planted early. It may increase the difficulty of getting a stand and give the plant for a long time a puny appearance, but every stalk of cotton planted in March, or first week in April, that survives, may be readily distinguished in any field that has been replanted later. It bears more, and earlier, and stands all the vicissitudes of June, July, and August better.

In cultivating Cotton, whether with the plow or hoe, the chief object is to keep down the grass, which is its greatest antagonist, bringing all, or nearly all, other evils in its train.

The most critical operation in working cotton is *thinning.* It should be done with great care, and, if early, with the hand. In a dry year it cannot be done too early after the plant is up. In a wet one it may be profitably delayed until it has begun to form, or later even.

Too much pains cannot be taken in preparing Cotton for market, for they are well remunerated by the additional price. The first thing to be attended to is to have it gathered free of trash. With a little care wonders can be effected in this way; and hands, with a short training, will pick almost, if not quite, as much without trash as with it. It should never be gathered when wet. And here it may not be out of place to remark, that one of the very best sanitary rules of a plantation is, never to send out your hands to pick until the dew has nearly or quite disappeared. It saves time in the long run, as well as health and life. Cotton should never be ginned until the seeds are so dry as to crack between the teeth. If damp, it is preferable to dry it in the shade, as the sun extracts the oil and injures the staple. If, by accident, however, it gets wet, there is no alternative but to put it on the scaffold. It is of great importance to sort the cotton carefully into several qualities, in ginning and packing, for by mixing all qualities together the average of the price is certainly lowered.

Every kind of Manure is valuable for Cotton.—Every kind of compost green crops turned in, cotton seed, and even naked leaves, listed and left to rot improves this crop. When planted on cotton seed, and sometimes on strong stable manure, it is more difficult to retain a stand, owing probably to the over stimulus of these strong manures. So, on leaves, unless well rotted, the cotton will long continue to die, in consequence of the leaves decaying away, and exposing the root too much to sun and rain. These difficulties may be avoided by a little pains, and by no means justify the opinion entertained by some, that cotton should never be planted on freshly-manured land. The only question is the cost of the manure. A great deal may be made on every plantation, without much trouble or expense, by keeping the stables and stable-yard, hog and cow pens, well supplied with leaves and straw. And also from pens of corn-cobs, sweepings from negro and fowl-house yards, and rank weeds that spring up about them, collected together, and left to rot. Whenever the business is carried further, and a regular force is detached to make manure at all seasons, and entirely left out from the crop, it becomes the owner to enter into a close calculation of the cost and profits.

The seed should be sown thinly and evenly in rows, not over five and a half feet apart, and upon properly prepared ground may be covered by a roller. This distance will give from fifteen to twenty hundred weight per acre. The sugar-loaf and cluster require a less distance both ways than the Mexican. The sugar-loaf may be profitably planted four and a half by eighteen to twenty-four inches; upon poor lands even at less. The seed should be kept wet for ten days before planting in a liquid made by steeping stable manure in weak brine, and when ready to plant, dry the seed by rolling in plaster. Good seed-planters should be used, and from five to ten seeds should be dropped in a place. If the seed be good, and the work carefully done, one half that number is sufficient. As soon as enough cotton is up to make a stand, the scraper should be started, which, upon straight and well-prepared beds, will shave the surface to within one inch of the plant, and cover all the grass in a four-feet row. Hoe hands follow and finish the cleaning of the ridge and arranging the stands. At the proper time the bull-tongue plow should follow and earth the cotton—say in a day or so after the hoes. Sometimes a second scraping is given, followed by a small shovel-plow to dirt the cotton, succeeded by the hoes to clean and level the ridge. After this, sweeps, cultivators, shovels, harrows, etc., are used—very seldom a turning plow. In good culture, and at every working of the plow, a little earth is thrown, and the bed kept nearly level by the hoe. Cotton requires a dry bed, not a high ridge, and the earth, therefore, should not be drawn up with the hoes. The ground should at all times be kept clean, and stirred every fifteen or twenty days, even to the picking, if on good land.

Tabular comparative statement showing the quantities of cotton exported from the United States to the principal commercial countries respectively, and the annual average amounts thereof; and the annual average amounts of duties derived therefrom, for a period of five years, from 1851 to 1855, both inclusive.

Countries to which exported.	Pounds of cotton exported from the United States in the years					Annual average amounts of cotton.	Annual average amount of duties paid.
	1851.	1852.	1853.	1854.	1855.		
Great Britain	670,645,122	752,573,780	768,596,498	696,247,047	673,498,259	712,312,141	Free.
France	139,164,571	186,214,270	189,226,913	144,428,360	210,113,809	173,829,584	$2,939,300 25
Spain	34,272,625	29,301,928	36,851,042	35,024,074	33,071,795	33,704,292	265,296 06
Hanse Towns	16,716,571	22,138,228	22,671,782	37,719,922	30,809,991	26,011,298	25,795 00
Belgium	16,335,018	27,157,890	15,494,442	13,980,460	12,219,553	17,037,472	Free.
Austria	17,309,154	23,948,434	17,968,642	14,961,144	9,761,465	16,789,767	Free.
Sardinia and Italy	10,320,496	17,934,268	17,487,984	12,725,830	16,087,064	14,911,110	Different rates.
Russia	10,098,448	10,475,168	21,286,563	2,914,954	448,897	9,044,806	47,018 36
Mexico	845,960	6,700,091	7,463,851	12,146,080	7,527,079	6,936,612	103,018 99
Holland	5,508,670	10,259,042	7,038,994	6,048,165	4,941,414	6,759,257	Free.
Sweden and Norway	5,160,974	5,939,025	6,099,517	9,212,710	8,428,437	6,968,132	Different rates.
British N. A. Possessions	23,525	16,582	12,295	72,790	883,204	201,679	Free.
Denmark	....	37,042	435,169	32,983	209,186	142,876	Free.
Cuba	113,572	294,852	196,392	250,633	9,620	173,014	2,355 42
Portugal	....	98,235	87,691	121,059	144,006	90,198	19 64
Elsewhere	722,473	141,803	652,395	1,946,895	270,822	746,918	
Total to all countries	927,237,089	1,093,230,639	1,111,570,870	987,833,106	1,008,424,601	1,025,659,165	

Enemies of the Cotton-Plant.—The boll-worm and the rust are the great enemies of cotton culture, and the former especially excites much apprehension and alarm. It has been estimated that the boll-worm destroys full one-third of the cotton crop, and so far no remedy has been found adequate to check its destructive ravages.

Rust among the Cotton.—If a remedy against the increase and ravages of the boll-worm cannot now be devised, on account of our ignorance of the nature of that insect, the case is different with the rust of the cotton plant. The nature of this rust is easily found out by the aid of a sufficiently powerful microscope, and known to be nothing else but a parasitical fungus, growing upon the stock and branches of the cotton-plant. This fungus is produced by a diseased state of the plant, caused by a stagnation in its growth, and a consequent relaxation in the circulation of the fluid or sap of the plant. Such a stagnation in the growth of the cotton-plant can be produced by an unfavorable season, it is true, and rust will appear in such cases everywhere, even in the freshest and best kinds of soil. Such cases are beyond the control of the best agriculturist, and belong to those chances which he has to bear; but such cases are extremely rare—of one hundred cases of rust among the cotton, perhaps scarcely one is owing to an unfavorable season, and ninety-nine to a defective cultivation; and these cases are consequently under the control of the agriculturist.

Our cotton land is generally better prepared than our land for small grain, but, by its cultivation, we commit especially the grave error, to continue for a number of years to plant the cotton in the same land, instead of introducing a rotation of our crops. With such a rotation, a little manure is all-sufficient to keep the land always in a fine state of fertility, and to improve instead of exhausting it.

Such a rotation of our crops has another most salutary and remunerating influence upon our cotton-fields—it will most certainly diminish the ravages of the boll-worm, and the enemies of the cotton-plant in general. The boll-worm is a caterpillar, the larvæ of a lepidopterous insect or butterfly of the night-swarming family, called noctua, which, as all the insects of that tribe, undergo, after having been hatched, three distinct metamorphoses, or changes. The insect originates in the form of a small egg, not near as large as the head of the smallest pin; the hatching of this egg, after a few days, produces the worm or caterpillar; this, when full grown, changes into a chrysalis or cocoon, and this, after ten or twelve days, is transformed into the perfect insect, butterfly or noctua. The individual natural history of the boll-worm is as yet very little known, but having the generalities of its nature in common with other insects of the same tribe, which are better known to entomologists, it must be, during the winter and the whole time when there is no food for it, either in the state of an egg, which is indeed most probable, or in the state of a chrysalis or cocoon; it can possibly not hibernate as a perfect insect or butterfly, not finding any food until late in summer. The eggs or cocoons that hibernate must be hidden in the neighborhood where the perfect insect lived, consequently in the cotton-fields, or near them. If such fields are not planted again in cotton next spring, the largest number of the brood must necessarily perish.

In our prairie soils, and wet and heavy soils in general, there is another cause which produces the rust among the cotton; this is the superabundance of moisture and the stagnation of the rain-water in the field. It is this which renders the prairie soil especially subject to the rust of the cotton-plant. Too much moisture and stagnant water, heated by the rays of the sun, produce immediately a stagnation in the growth of that vegetable; it does not allow it to imbibe enough of that solid matter necessary for its growth, especially as this plant is much more adapted to dry and light than to wet and heavy soil. If we, therefore, will plant cotton in heavy and wet, especially in prairie soil, it is absolutely necessary that this soil should be as much as possible protected against superabundance of moisture and stagnation of rain-water. This can only be done by a vigorous system of draining; by ditching where it is necessary, and leading the water, by means of deep furrows, into the ditches. In fact, in no soil is a system of ditching more necessary than in the prairie soil. If it is neglected even only in one place, and the rust makes its appearance, if only in that one place, it will soon spread over the largest portion of the field, it being an infective disease. The minute seeds of the microscopic mushroom ripen quick, and are carried by the slightest breeze all over the field.

The Cut-Worm.—The practice of burning off the old cotton and corn stalks, grass, etc., to supply ashes to the soil, or their direct application to it, when obtained from other sources and late plowings—say about the 1st of April—are the remedies most relied upon for the destruction of the cut-worm.

Dry Rot in Cotton.—The best remedy for this disease is to procure seed from a distance—that from a more northern latitude being preferred.*

Special manures—potash and lime, or ashes and bone-dust.

CULTURE AND USE OF RICE.—The culture of rice is an important branch of agricultural attention in some of the southern portions of the United States. In 1847 it is estimated that there were raised there over one hundred million pounds. The value of it cannot be less than three millions of dollars—probably more. About three-fourths of this was produced in the state of South Carolina.

The mode of culture pursued on the rice-lands on the lower Mississippi is thus detailed by Dr. Cartwright, a practical planter:

"The seed is sown broadcast about as thick as wheat, and harrowed in with a light harrow having many teeth; the ground being first well plowed and prepared by ditches and embankments for inundation. It is generally sown in March, and immediately after sowing, the water is let on, so as barely to overflow the ground. The water is withdrawn on the second, third, or fourth day, or as soon as the grain begins to swell. The rice very soon after comes up and grows finely. When it has attained about three inches in height the water is again let on, the top leaves being left a little above the water. Complete immersion would kill the plant. A fortnight previous to harvest the water is drawn off to give the stalks strength, and to dry the ground for the convenience of the reapers.

* Cotton-Planters' Manual.

"The same measure of ground will yield three times as much rice as wheat. The only labor after sowing is to see that the rice is properly irrigated; except in some localities, where aquatic plants prove troublesome, the water effectually destroying all others. The rice grounds of the lower Mississippi produce about seventy-five dollars' worth of rice per acre. The variety called the Creole white rice is considered to be the best."

Upland rice is cultivated entirely with the plow and harrow, and grows well on the pine-barrens. A kind of shovel-plow, drawn by one horse, is driven through the unbroken pine forest, not a tree being cut or belted, and no grubbing being necessary, as there is little or no undergrowth. The plow makes a shallow furrow about an inch or two deep, the furrows about three feet apart. The rice is dropped into them and covered with a harrow. The middles, or spaces between the furrows, are not broken up until the rice attains several inches in height. One or two plowings suffice in the piney woods for its cultivation—weeds and grass, owing to the nature of the soil, not being troublesome.

THE HISTORY AND MANUFACTURE OF SUGAR.—The art of cultivating the sugar-cane has been practiced in China from the highest antiquity. It was unknown to the ancient Egyptians, Jews, Greeks, or Romans, and did not pass into Arabia till the end of the thirteenth century. From Arabia it was carried into Egypt, Nubia, and Ethiopia. The Moors obtained it from Egypt, and the Spaniards from the Moors. In the fifteenth century, the cane was introduced into the Canary Islands by the Spaniards, and into Madeira by the Portuguese, and thence into the West India Islands and the Brazils.

Previous to the year 1465, sugar was known in England chiefly as a medicine; and, though cultivated in a few places on the Mediterranean, it was not more generally used on the continent. Now, in point of importance, it ranks next to wheat and rice among all the products of the vegetable world, and has become the first article of maritime commerce. The Atlantic has been the principal theater of this trade, which, more than any other circumstance, contributed to give a new spring to commerce in Europe, and to engraft slavery, with all its calamities, upon the new world.

The sugar-cane, like the bamboo and Indian corn, belongs to the family of the grasses. It grows to the height of seven or eight feet or more, and its broad leaves, and large silky panicles, give it a beautiful aspect. The stems are very smooth, shining, and filled with spongy pith. The flowers are small and very abundant, clothed externally with numerous silky hairs. The sugar-cane flowers only after the lapse of an entire year. In the West Indies it is propagated by cuttings from the root end, planted in hills or trenches in the spring or autumn. A plantation lasts from six to ten years.

The juice of the sugar-cane is so palatable and nutritive, that, during the sugar harvest, every creature which partakes freely of it, whether man or dumb beast, appears to derive health and vigor from its use. The meager and sickly negroes exhibit at this season a surprising alteration; and the laboring horses, oxen, and mules, though constantly at work, yet, as they are allowed to eat, almost without restraint, of the refuse plants and scummings from the boiling-house, improve infinitely more than at any other period of the year. Indeed sugar is supposed to be the most nourishing substance in nature; persons have lived upon it in times of scarcity on board a ship; it is also wholesome, as it in such cases cured the scurvy. The Indians prefer it for their long journeys, because it does not corrupt and spoil like many sorts of provisions; and they mix it with an equal quantity of powdered Indian corn. It may be added, that the plague has never appeared in those countries where it is in much use; and also, that it tends to hinder the virulence of malignant fevers.

Process of Manufacture.—The following, from Mr. D. J. Browne, a sugar-planter in the Island of Cuba, will give our readers a good idea of the process of manufacture, and furnish to those who are growing the Chinese sugar-cane hints for the expression of its juices and their conversion into sugar.

"As soon as the cane is fully matured, cut, and carted to the mill in quantities sufficient to commence the operations of grinding and boiling, a busy and cheerful scene ensues. The mills are set in motion by oxen urged on by the negro song; the canes are passed through the rollers; the rich white juice begins to flow, which is conveyed into receivers; negroes are employed in making lime-water, washing and cleaning the boilers, adjusting the 'ormas,' or moulds, and preparing fuel for lighting up the fires. The apparatus for grinding usually consists of three upright rollers of iron or wood, turned by oxen or steam, but rarely there may be found the horizontal rollers of Collinge, improved by Bell and others. The canes are twice subjected to the action of these rollers, by which means they are nearly deprived of their juice; and the trash is carried away, spread upon the ground to dry, and afterward used for fuel. The expressed juice flows from the mill, in gutters, into copper receivers, or clarifiers, which are generally two in number, and are placed over the flues. The caldrons, or boilers, are four in number, and are proportioned in size according to the power of the mill and the extent of the plantation. The boiler into which the clarified juice is first conveyed from the receiver is usually equal in capacity to the receiver itself, and on this estate contains seven hundred and twenty gallons. The second boiler is of about two-thirds the magnitude of the first; the third, three-fifths of the second; and the fourth, or last boiler employed, is of about one-half the capacity of the third. The boilers are set near to each other, in a direct line, the first two having separate flues, which are provided with dampers for regulating the draught, and diminishing at pleasure the action of the fire.

"A trusty man is employed to watch over and direct the whole operation of the mill. A part of his duty consists in seeing that all parts of the establishment, and every vessel or implement is kept clean and in order. Without this cleanliness, an attempt to manufacture good sugar would prove futile. The rollers, mill-beds, and gutters for conducting the juice, must be well sprinkled with lime whenever the work stops; and every morning and evening all the utensils must be washed with hot ley or lime-water, and afterward rinsed with clean cold water.

"As soon as the mill is put in motion, and a clarifier is filled with expressed juice, the fire is lighted up, and the process of 'tempering' commenced. This consists in adding an alkali to the juice, in such quantities as the practical knowledge or discretion of the operator may dictate. In general, about one quart of clear lime-water is used in six hundred or seven hundred gallons of juice from old cane, and about double that quantity to that of new cane. In some plantations, however, the natural properties of the cane are such that no tempering is necessary beyond that produced in cleansing the boilers and utensils with lime-water.

"As the juice in the clarifiers becomes heated nearly to the boiling point, the feculent matter separates and rises to the surface in the form of a scum. It is then conducted into the largest caldron, where it is suffered to boil. The scum, as it rises, is carefully removed with a skimmer, and as soon as the juice in this boiler is so reduced by skimming and boiling that it can be contained in the second boiler, it is laded therein. The same process is then continued in the second boiler as in the first; and if the color of the liquor does not then appear so clear as may be desired, more lime-water is added. If the froth rises in large bubbles and the liquor is clear, it is considered to be in good condition. When the liquor is sufficiently reduced to be contained in the third boiler, it is transferred thereto, and so on to the fourth, where the fire is more intense. The last two boilers are kept full by constantly lading the syrup from one into the other, and at the same time continuing the skimming. When the ebullition of the syrup becomes too violent, it is prevented from running over by beating it and breaking the bubbles with a large skimmer or wooden spatula. As soon as the 'proof point' arrives, the fire is abated, and the syrup as rapidly laded into a cooler, and the boilers immediately refilled. This point is determined by observing when grains of sugar begin to form on the back of the ladle when cooled, or when a thread of the syrup produced by the thumb and forefinger will break before it can be drawn beyond a length of half an inch.

"Contiguous to the boilers are placed the coolers, which generally consist of large log troughs, or vessels formed of planks about ten feet long, five feet wide, and one foot deep. Two successive charges of syrup are conveyed from the last boiler into each cooler, and there left to remain until crystallization takes place, which usually requires but a few hours. The syrup or sugar is then transferred into the ormas, or conical earthen moulds, or, more recently, into barrels or hogsheads, which are placed over the molasses cistern and left to drip. In the course of twenty-four to thirty-six hours the plugs are withdrawn from the ormas or hogsheads, and they are allowed to remain undisturbed for twenty or thirty days. The sugar is then removed from the moulds and emptied on wooden platforms, and exposed to the rays of the sun until its color and texture please the operator. It is then assorted and packed up in casks for shipment.

"The article manufactured by the foregoing process is known in Europe and the United States as 'Muscovado,' or brown sugar, and is the material from which white or loaf sugar is often made."*

* Stanbury's "Chinese Sugar-Cane."

Chinese Sugar-Cane: its Culture, and Production of Sugar.—The following, from the "Southern Cultivator," contains clear and reliable directions for the cultivation of the Chinese sugar-cane, and of the subsequent treatment of it in the manufacture of sugar.

The Chinese sugar-cane seems to adapt itself to all the vicissitudes of our variable climate and soil with a facility unsurpassed by corn or wheat. In Cherokee, Georgia, it flourishes in a high degree of perfection upon soils high and low, rich and comparatively poor, producing heavy crops of stalk, leaf, and seed. The experiments of Mr. Peters present an example of most successful culture. I have found it to grow with me in all respects as vigorously as corn, with precisely similar treatment. In Allegany County, Maryland, a correspondent writes for the May number of *The American Farmer*: "I think it well adapted even to our mountainous country, and promises to be more valuable than any other article that we can grow for provender. I think it will produce six or eight tons of dried provender to the acre. The present writer has met many intelligent and enterprising farmers of Pennsylvania, Maryland, Virginia, New Jersey, and New York in attendance at the late national fair at Philadelphia. Many had witnessed its growth in their respective states with entire success. One gentleman of New Jersey had grown half an acre of the cane this season. It has been successfully grown in Illinois also, and one gallon of the juice is said to have yielded, by boiling, a quart of syrup of good quality. There is every reason to conclude that the cane may be easily and successfully grown in all parts of our country.

"**Culture.**—While the seed remains in the hands of the few, and commands a price too high to permit a waste, it should be planted for one season with good distance, that the seed crop as well as the cane may attain their highest state of development. I would recommend that the rows should be three or even four feet apart, and a distance of say two feet given in the row, dropping one or two seeds in a place. Let the ground be well cultivated, as for corn, and the shoots or suckers which spring up from the root, be all permitted to grow. A small portion of the crop should be reserved for seed, and permitted to stand until fully matured and dry. It would be well to limit the canes in the seed-patch to one. By all means permit no broom-corn, Dourah corn, or other plants of the same family, to grow near your cane. It readily intermixes with these varieties, and effectually ruins your seed for the production of syrup. For the same reason, great care should be observed in procuring reliable seeds, as well as in keeping them so.

"After the first season, when a full supply of seed shall have been secured, a better paying syrup crop may be grown by closer planting. The space between the rows may well be narrowed down to three feet, and the seed put in, say two or three every six inches. When well up, the stoutest and healthiest plants should alone be allowed to stand. The cane, when very young, presents so much the appearance of grass, that an advantage may perhaps be gained by dropping some other seed with the cane, that the latter may be more readily distinguished. This, of course, should be drawn out with the superfluous cane-plants. When of sufficient size, the plants should be suckered down to one cane for each root. In other respects, the successful grower of corn will not be at a loss in the cultivation of this plant. I have found a suitable time for planting to be immediately after the corn crop, although excellent results have been obtained by planting as late as the 15th of May, in Cherokee, Georgia. It will doubtless be desirable to make several successive plantings, that they may mature gradually, and so give more time for harvesting the crop. The land, in my opinion, should be prepared in all respects as for corn.

"**Harvesting.**—When the stalk shall have attained its full size, and the seed have passed from the dough stage to a harder texture, the cane may be considered sufficiently mature. Or if the crop be large, and a deficiency of hands be apprehended, the cane may be cut earlier, and the cuttings continued from time to time, as needed for the press. The fodder should be pulled as for corn; another set of hands cutting off one-half to two feet of the top with the seed, while others cut the cane at the ground and throw it into piles, from whence it is hauled to the press.

"Prior to the harvesting, a set of proper rollers and kettles should be provided and well set up, ready for service. The mill made use of by Mr. Peters, and which was gotten up under his direction for the purpose, is, in my opinion, of very unexceptionable quality for a small apparatus, and works admirably. It is of a suitable size for a small crop, and no farmer should undertake to supply its place by wooden rollers, for a crop of even two acres. The loss of juice will more than counterbalance the difference in expense. It is worked by two mules. Three kettles, of from sixty to one hundred gallons' capacity, will be required to keep pace fully with the mill. It is desirable that these should be broad and shallow, that they may present a large evaporating surface, and substantially set in brick for security and convenience. They should not be distant from the press, and if upon ground lower than the latter, an advantage is gained in running the expressed juice directly into them, and thus saving the labor of transfer.

"**Pressing.**—The canes, located conveniently at hand, are one by one doubled in the middle and forced between the rollers, which are kept in as close proximity as the strength of the mill and the power of the mules will warrant. An active hand will feed the mill easily, if the canes be placed within his reach. A boy is required to drive, and, if the mill be well constructed, to throw off the bagasse from behind, nothing more is required, except an occasional removal of the latter by a pitchfork, to keep it out of the way of the mules.

"**Boiling Down.**—One of the first things done in commencing operations should be to start the fire under the kettles, that they may be well warmed by the time the juice is ready for them. The fires should be so arranged that they may be under good control, to be forced or withdrawn as occasion may require. When the juice is placed in the boiler, the fire should be gradually increased to a simmering heat—not to active boiling—and maintained at this temperature until a thick green scum rises to the surface and forms into puffs, seeming ready to crack. This scum, when fully formed, should be removed clean from the surface. The heat may now be raised to boiling, and kept in an active state of ebullition until the bulk is reduced one-half. The fire may now be removed from one kettle, and its contents be transferred to the other, when the heat must be gradually moderated as the syrup becomes more concentrated, to avoid the danger of scorching, which injures the color and flavor. Should more dirty green scum rise to the surface after the first skimming, it should likewise be removed.

"In regard to the precise degree of concentration to which the syrup should be brought, it is exceedingly difficult to lay down any precise and simple rule which shall meet every case. The plan for determining it in use on the sugar-plantations, and which was adopted by Governor Hammond and Mr. Peters, is based upon the judgment of the eye, in respect to the consistence of the syrup when poured from the ladle, and cooled as it drops from its edge. This test is evidently very defective, since the temperature of the atmosphere regulates the consistence which the syrup must assume on cooling down—so that a syrup boiled on a cold day will necessarily be thin and watery as the weather moderates, and a syrup finished at night will differ materially from that of the noon-day. Although a good approximation, it is not exact enough for the tyro—to secure a desirable uniformity in the consistence and value of the product, or to obviate the danger of fermentation and loss. To remedy this uncertainty, and secure a uniform result at all times, I have constructed a simple instrument which determines readily, and with certainty, the precise moment when the syrup should be removed from the fire and transferred to the barrels. For the convenience of those who may desire this aid, I shall prepare a number of them during the season, which may be furnished by mail. With such a guide to the uninitiated, there are certainly few more simple operations upon the farm than the manufacture of syrup from this cane.

"It is a prevalent opinion that lime should always be added to the juice as soon as it is pressed out, and the idea has been advanced that it could not be clarified without lime. This is undoubtedly a mistake. The juice alone, under my hands, clarifies itself more readily without lime than with it. The latter answers no useful purpose, so far as the syrup is concerned, save to neutralize the free acid—phosphoric—which exists naturally in the cane. Lime darkens the color, and, to my taste, detracts from the peculiar grateful flavor of the syrup. Many would, perhaps, object to the slight acidity. To such I would say, use the lime, but use it sparingly. To prepare it for use, take half a peck of lime, slake it in a bucket of water, gradually added; stir up well, and strain the milk through a cloth; let it settle for half a day; pour off the water, and dry the powder. Of the latter, you may use from half a teaspoonful to two teaspoonfuls for every five gallons of juice, after the scum has been removed.

"**To Convert the Syrup into Sugar.**—The great art of sugar-making is to get the largest quantity of crystals and the smallest of molasses, or syrup, and this will depend in a great measure on the rapidity of the process. Even the quality of the molasses itself is dependent upon its rapid concentration during the early stages of manufacture. All must have observed that a freshly-broken or cut apple, if exposed to the atmosphere, will become brown in a short time, and a similar effect is constantly being produced upon the cane-juice from the time it is expressed until its final concentration. The apparatus, therefore, for clarifying, concentrating, etc., should be so constructed as to secure the greatest rapidity of action. In a small way, brass kettles may be used, but for larger operations, requiring new ones to be constructed, they should be of copper. The use of alkalies in clarifying has long been known, and their excessive use often injures the quality of the results.

"The operator should supply himself with three kettles, two of large and one of small size. The juice, as soon as expressed, should be placed in one of the large kettles, and to it should be added (say to ten gallons) half a teaspoonful of cream of lime, one pound of finely-ground and freshly-burned bone-black, and two ounces of bullocks' blood, or the whites of two eggs, or half a pint of skimmed milk—either will do. The blood, or eggs, if used, should be beaten, and then well divided throughout the mass, stirring all cold and during the early part of the heating. The process in this kettle should be conducted somewhat slowly, and if the kettle be large enough to permit all the scum to rise without overflowing it, the scum need not be removed, as it will remain on top of the fluid, becoming more and more compact. The juice should not be allowed to boil or simmer.

"After the clarification is perfect the scum on top will crack open in all directions, and white sparkling bubbles will rise through these cracks, overflowing the top of the scum, and it will turn over in masses. The scum may then be taken off and the juice thrown on a blanket in an open basket, thus partially filtering the mass. It should then be placed in kettle No. 2, and boiled as rapidly as possible until a thermometer placed in it will indicate 220° Fahrenheit; when it should be again filtered; the first portion passing the filter should be returned, as it will not be quite clear. The whole then will be bright, and may be put in kettle No. 3, which need be but half the size of the others, and should be placed on a clear strong fire, and so arranged that it can be readily taken from the fire at short notice. Place in this kettle a thermometer—it will commence boiling at 220° and gradually increase to 240°; the instant it reaches that point it should be taken from the fire suddenly, for if permitted to rise to 241°, or more, it can never be purged. Let it stand in this kettle until a slight crust commences to form on the sides and top, then scrape this down with a wooden spatula, thin at the end and edges, and stir it all until evenly mixed with the more fluid portions, then pour into a conical sugar-mould, stopped at its lower end, and place the nose of this mould on a drip-pot—this sugar-mould should be of the kind known as Bastar mould, and it and the drip should stand in a warm place. The next day the sugar in the mould will be solid, and the plug in the bottom of the mould may be withdrawn and an incision made upward with a pegging-awl, replacing the mould on the drip-pot. The sugar or molasses will gradually drip from the nose of the mould into the pot, and the time necessary for this purging will depend upon the heat of the apartment where it is placed. Usually the syrup will all run off in the natural way in a week or ten days, leaving the sugar in the mould of a light straw-color."

THE PEA CULTURE AND USE—Varieties.—This plant has many admirable varieties, though a select few are sufficient for cultivation. The early Charlton and the common white and Suffolk sub-varieties of it are, in many localities, sown with equal frequency in the field and the garden for table use; the low-growing sorts, which require no stakes, being of course those that are suited to the extensive culture in the field. But the gray kinds are the ordinary varieties for the farmer's purpose, whether he applies the produce to the fattening of his own swine or sells it for a similar purpose.

Soil.—The pea requires a sandy loam, or other warm calcareous soil, free from stagnant moisture, and also a climate usually dry in summer, when the crop is ripe. The gray sorts are sown as early as possible in the year, to have the crop off the ground in time for one of turnips. To economize seed and admit of perfect hoeing, field pease should be sown in drills. The haulm is superior as fodder to that of beans, and therefore should not be used merely for litter.

Garden Sorts.—In the garden the early Charlton may be sown first. The early frame is another of the most approved early varieties, and Knight's, and the whole family of marrowfats—with Thurston's "reliance" in particular—should be successively sown from April to June, at intervals of three weeks in spring and a fortnight in summer. For very late crops the seed should be that of early kinds, because these complete their growth in a shorter time than the late and slower-growing sorts.

Saving Seed.—In saving seed of pease or beans, it is not prudent to take the gleanings of the crop, which cannot be the most vigorous, and are obviously the latest in growth. To procure an early or late sub-variety of any sort, the first and last ripened pods of that sort should be carefully selected and stored separately; by repeated sowings and the same management, the habit of earlier or later ripening will thus be imparted in course of time to the seed. In gathering young pease from the first crops much waste is committed; pods but half filled are pulled from their stems, and the consequence is, that besides the loss occasioned by using the immature fruit, the succeeding pods from the same stalks will not acquire the plumpness which they would have attained if the former pods had been left a little longer on the stems. This may possibly be occasioned by the premature exhaustion of the plant through the loss of sap which it sustains in those parts where the yet imperfect pods are taken off. The sap is in full flow to the young pods, and bleeds forth on their removal—an exhausting process, which does not take place when the pods are so far ripened as to have ceased drawing nutriment from their succulent parent, which then directs its juices to the parts in need of them.

Cultivation.—"All the sorts may be grown without sticks, and even better than with. I have this year had the finest pease I ever saw, and the crop the most abundant. And this is the manner in which I have sown and cultivated them. I plowed the ground into ridges, the tops of which—for the dwarf sorts—were four feet apart. I then put a good parcel of yard-dung into the furrows, and plowed the earth back upon the dung. I then leveled the top of the ridge a little, and drew two drills along upon it at six inches distant from each other. In these I sowed the pease. When the pease were about three inches high, I hoed the ground deep and well between the rows and on each outside of them. I then plowed the ground from them and to them again, in the same way as in the case of Swedish turnips. In a week or two afterward they had another plowing, and soon after this they fell, and lay down the sides of the ridges. This was the way in which I managed all the sorts—only in the case of the Knight pea I put the ridges at six feet asunder. This was, of every sort, the very finest crop of pease I ever saw in my life. When not sticked, and sown upon level ground, pease fall about irregularly, and in case of much wet, the under pods rot; but from the ridges they fall regularly, and the wet does not lodge about them. You walk up the furrows to gather the pease, and nothing can be more beautiful or more convenient. The culture in the garden may be the same, except that the work which is done with the plow in the field, must in the garden be done with the spade. As to seasons, the early pea may be sown in the fall; but in this case, care must be taken to guard against mice. Sow about four inches deep, and tread the ground well down. When the frost sets in, all is safe till winter breaks up. These pease will be earlier by ten or fifteen days than any that you can sow in the spring. If you sow in the spring, do it as soon as the ground is dry enough to go upon. Sow the May pea, some Charletons, some Hotspurs, some blue peas, some marrowfats, and some Knight pea, all at the same time, and they will come one after another, so as to give you green pease till nearly August. In June (about the middle) sow some early pea again, and also some marrowfats and Knight pea, and these will give you pease till September. Sow some of each sort again about the middle of August, and they will give you green pease till the *hardish* frosts come. But these two last sowings (June and August) ought to be under a south fence, so as to be partially excluded from the intense heat."*

The only remedy for the pea-bug is late sowing—say about the 10th of June.

Special manures—ashes and bone-dust.

MANGEL-WURZEL.—The value of this truly excellent forage plant is now quite generally understood, and its culture as a store for winter use extensively adopted. For cattle and hogs it is among the most profitable crops grown, yielding more bulk, with real fattening qualities, than perhaps any other root we have.

Season for Sowing.—The seed, which should be chosen from the most perfect plants, is sown in May. If sown sooner, there is some danger from the frosty nights which often occur about the beginning of that month; or if the spring is warm and genial, it gets too forward, and instead of increasing in the root, it shoots up a seed-stalk, and the root becomes comparatively useless. If it is sown later than May, it never arrives at a full size before the approach of winter—hence the first or second week in May is the best time in our climate.

Culture.—When the plants are three inches above ground, they may

* Cobbett.

be thinned out a foot apart in the rows; the intervals between the rows may be stirred with the plow, grubber, or horse-hoe, and the intervals from plant to plant in the row with the hand-hoe. The ground cannot be kept too fine and open, provided the soil be not extremely porous, and the weather very dry; in that case it must not be stirred so much, for fear of the moisture evaporating too much. It is a common practice to throw the earth from the rows against the roots; but the most experienced cultivators do not approve of the method; on the contrary, they recommend drawing the earth from the plants, or at least laying the whole ground level. Where the soil is naturally rich and deep, the drills may be made on the level ground; but if the soil is shallow, or the subsoil of a barren nature, it is best to raise small ridges, as is done for turnips on the Northumberland plan, and bury the dung under them, by which means the roots have more room to strike downward. As soon as the outer leaves begin to droop, they may be gathered and given to cattle, but a tuft should be left in the center to carry on the vegetation, or else the roots will not increase. This practice of gathering the leaves is strongly recommended by some, and they assert that the root does not suffer in the least, although the leaves are reproduced; but here we would give this caution, founded on experience and observation. The drooping leaves, if not gathered, will decay and fall off; they have performed their office, and therefore to gather them before they wither is a real economy; but to strip off fresh and growing leaves must injure the plant, and the juices required to replace them are so much taken from the growth of the roots. When fodder is very scarce, this may be a sacrifice worth the making.

The improved variety of this beet, which grows to a very large size in good soil, has a red skin, and when cut through appears veined with red, in concentric circles. The principal part of the root rises often a foot and more above the ground, and the leaves, which are large and succulent, spring from the crown of the root. There is a limit, however, beyond which the root does not improve in quality as it increases, and the roots of a moderate size contain more saccharine and nutritive matter in the same bulk than the larger. This is particularly the case with those varieties from which sugar is extracted. The soil best adapted for the beet-root is a deep sandy loam, naturally rich, or made so by repeated manuring. The manure should be well incorporated with the soil, and if any is added for this crop, it should be well rotted and plowed-in deep.

Use and Value.—It is said that the cows fed entirely on beet become too fat, and give less milk; but this would be no objection with the cow-keepers who unite the fattening of their cows with the milking, and like to have them ready for the butcher as soon as they are nearly dry. For bullocks they are excellent; for horses, Swedish turnips are preferable. The proportional value of hay, potatoes, Swedish turnips, and beet in feeding cattle, according to Einhof, whose statements Thaer has found to agree with his experiments, is as follows: eighteen tons of mangel-wurzel are equal to fifteen tons of ruta-baga, or seven tons and a half of potatoes, or three tons and three-quarters of good meadow hay, each quantity containing the same nourishment; but the roots may be grown upon less than an acre, whereas it will take two or three acres of good meadow land to produce the equivalent quantity of hay; and of all these root crops, the least exhausting for the land is the beet.

The flesh-forming constituents of the mangel-wurzel, in the opinion of careful experimenters, exceed those of either the turnip or carrot. In the carrot we find about the same amount of water, and in the turnip more than in either. The beet, too, is much better adapted to our climate, is a much more certain crop, being much less troubled with insect ravages, and by summer droughts. We caution our readers not to follow too implicitly the directions of European cultivators, as the great difference in the dryness and heat of our climate renders it unsafe to do so. In England the climate is admirably adapted to the growth of the turnip, and there it forms the alpha and omega of their agriculture.

The mangel-wurzel should be stored a few months before feeding, as when first drawn they contain an acid matter that scours the animals. Pectic acid diminishes with age, and the quantity of sugar increases.

Preservation.—Take them up three weeks before the hard frost is to come; cut off their leaves; let them lie two or three days upon straw or boards to dry in the sun; then lay a little straw upon the ground, and, in a fine dry day, place ten bushels of beets, picking out all the cut or bruised ones, upon it in a conical form. Put a little straw smoothly over the heap; then cover the whole with six or eight inches of earth, and place a green turf at the top to prevent the earth from being washed by rain from the point before the frost sets in. The whole heap will freeze during the winter, but the frost will not injure the beets, nor will it injure carrots preserved in the same way. If you have more than ten bushels, make another heap, or other heaps, for fear of *heating* before the frost comes. When that comes, all is safe till spring, and it is in the spring—that season of scarcity—for which we ought to provide. How many bushels of beets are flung about and wasted in the fall, the smallest of which would be a treat in the month of May! Beets may be transplanted, and will in that way get to a good size.

Special manures—common salt and ashes.

BEANS.—The soil best adapted for beans is a rich, strong loam, such as produces good wheat. In such a soil the produce is sometimes fifty or sixty bushels per acre, but an average crop, on moderate land, is about half that quantity. By cultivating the beans in rows, and by careful hoeing and manuring, alternate crops of wheat and beans may be raised for many years without intermission, or any necessity for change or fallow.

The wheat which follows beans is generally good and heavy, and seldom runs to straw. After wheat-harvest the stubble is plowed up and turned in with a very deep furrow; the land is harrowed flat, and a good coating of manure is put on in a moderately rotten state, and this is covered with a shallow plowing; the land is well water-furrowed and left so till spring, when the beans are drilled in the mellow surface produced by the winter's frost. This is the most approved practice; but many experienced farmers vary it according to the varieties of soil, or according to difference of opinion. Some put on manure for the beans in spring, and some drill the beans in every second or third furrow after the plow; but all good farmers agree in manuring the land for the beans and carefully hoeing them. It is evident that a different method is required in different soils, varied according to their texture and situation. Alternate crops of wheat and beans can only succeed, for any length of time, on soils peculiarly favored. In general, a change of crops and occasional fallows will be indispensable to keep the land perfectly clean and in good heart.

Although the nutritious matter in a good crop of beans is great, and almost equal to that obtained from a crop of wheat, it exhausts the soil much less: its succulent stems and leaves absorb much nourishment from the atmosphere, and the latter falling off and decaying restore carbon and mucilage to the soil, and make up for the inferior quantity of manure produced by the bean-haulm in comparison with wheat-straw. There is perhaps no crop bearing seed which gives so great a return with so small an expenditure of the nutritive juices of the soil; and certainly none that repays manure better, or leaves the land in a better condition for wheat or oats.

The principal use of beans is to feed horses, for which purpose they are admirably adapted, and far more nourishing than oats. They should be bruised or split in a mill, and given to horses mixed with hay and straw cut into chaff; this will insure proper mastication and prevent that thickening of the wind, as it is called, caused by indigestion, which makes beans alone not so well adapted for the food of hunters and race-horses. Great quantities of beans are consumed in fatting hogs, to which they are given whole at first, and afterward ground into meal. Bacon hogs may be fatted entirely on beans and bean-meal; but as this food makes the flesh very firm it is not so well adapted for delicate porkers. In the last period of their fatting, therefore, barley-meal is usually substituted for bean-meal. Bean-meal given to oxen soon makes them fat, and the meat has less fat than when oil-cake is used for that purpose: mixed with water and given as a drink to cows it greatly increases their milk. A small quantity of beans is generally mixed with new wheat when ground to flour; the millers pretend that soft wheat will not grind well without beans, and they generally contrive that there shall be no deficiency in the necessary proportion. Thus a quantity of beans is converted into what is considered as wheaten flour. This practice is well known to all bakers and dealers in flour; and as there are means of discovering the quantity of bean-meal in the flour, the ignorant and unsuspecting only are deceived, and the price of the flour to the skillful purchaser varies according to the quality.

The proportion of nutritive matter in beans, compared with other grain, is, according to Einhoff, as follows:

	By weight.		Or in a bushel.	
Wheat	74	per cent.	about	47 lbs.
Rye	70	"	"	39
Barley	65	"	"	33
Oats	58	"	"	23
Beans	68	"	"	45
Pease	75	"	"	49
French Beans	84	"	"	54

Beans Grown with Indian Corn.—Beans are often planted with corn.

The corn is planted about three and a half feet apart each way, and beans are planted between the hills of corn in one direction only. The corn and beans are cultivated in the usual way, but only in one direction. In this way, with a very slight increase of labor, from fifteen to twenty bushels of beans per acre may be raised without a perceptible diminution of the growth of the corn; and they will pay the entire labor expended upon the cultivation of both crops.

Special manures—ashes, salt, and bone-dust.

CABBAGE.—The cultivation of cabbages is the same in the field as in the garden, except that on a large scale less attention is paid to each plant, and the spade is superseded by the plow and other instruments. A good and rather stiff loam is best adapted to cabbages. They require a considerable portion of manure if the land is not naturally rich, or if they are cultivated as a part of a regular rotation. There is no vegetable which produces so large a portion of food for cattle on the same space as the cabbage, provided the soil suits its growth. Though it impoverishes the ground, this should not prevent its being extensively cultivated, provided the nourishment it produces compensates for the additional manure required. The great advantage in the cultivation of the cabbage is, that a great portion of its substance is restored to the ground in all well-regulated farming establishments, in the shape of the dung and urine of the cattle fed upon them. It is asserted by experienced agriculturists that in this respect it is superior to the common turnip.

Rapid Method of Transplanting.—The cultivation of the cabbage on a large scale is by no means so general on the soils well adapted to it as might be wished. This is probably owing to the trouble of transplanting, and the occasional failure of the plants in very dry weather. But the trouble and expense may be greatly diminished by attention and method. The plants may be raised in such abundance by having a regular garden for the purpose, that they may be transplanted at various times, and the plants placed so thick as to allow for failures, while those which are superfluous may be hoed out. The cause of failure is generally in the careless manner of planting. Holes are usually made in the ground with some blunt instrument, the plants are put in without its being noticed whether the roots are doubled up or straight, whether the earth is pressed close to the roots, or vacancies are left between them and the soil, in which case they cannot take root properly. The ground having been well prepared, and being in good heart and tilth, the plow should open a deep and narrow furrow. The plants having been carefully taken up without breaking the fibers of the root, the tops should be cut off to about six inches from the crown; children with baskets, in which the plants are carefully laid, should then go along the furrow and place them at the distance of eighteen inches or two feet from each other, against the earth which has just been turned over by the plow, so that the bottom of the roots shall lie along the newly-formed ridge, and the crown of the plant be on a level with the surface of the ground. A slight push will make it adhere to the fresh soil. If some rich mould is mixed with drainings of the dunghill to the consistency of soft mud, and the roots of each plant are dipped in a pail of this moisture immediately before planting, the plants will seldom fail. The plow, in returning, covers all these roots with the earth of the next furrow, and a man follows and presses his foot obliquely against the furrow-slice at the place where the head of the plant appears. The plow then takes two shallower and broader furrows, or leaves a space of two feet between the last-made furrow, and forms another in which plants are again placed and covered up as before. In this way from two to three acres may be properly transplanted in a day by one horse, two men, and three boys.

The repeated use of the plow and horse-hoe between the rows is necessary for the growth of the cabbages, as well as highly useful to clean the land. By this mode of cultivation, much labor is saved, the risk of the failure of the plants is greatly diminished, and if the ground has been well prepared and sufficiently manured, an astonishing weight of solid food for cattle is obtained. The best sort to plant in the field is the large red or the Scotch drum-head cabbage. Should the ground be of great fertility, and at the same time compact, the large Strasburg cabbage, which grows to the weight of sixty and even eighty pounds, will produce an enormous weight of food. This cabbage is common in Germany.

Diseases of the Cabbage.—Cabbages are subject to a peculiar disease when repeatedly planted in the same ground. The bottom of the stem enlarges, and the plant becomes sickly. This disease is called *clubbing*, and is occasioned by an insect, which deposits its eggs in the substance of the stem where it joins the root; the organization of the plant is deranged, and the cabbages never come to perfection. The only remedy for this disease is to change the cultivation, and for a time to plant no cabbages on the ground which produces clubbed plants, but to trench it up well, and expose it to the winter's frost in ridges; quick-lime should be put on it, but no manure, and other vegetables of a different class should be sown for two or three years. After this it may be considered as purified, and cabbages may safely be planted there again. In the fields, where the cabbages do not return so frequently on the same ground, this disease is seldom found. The depredations of caterpillars and slugs are sometimes very great. The only means of prevention is to pick them off as soon as they appear. Ducks and fowls in this case are excellent helps, the former especially, for clearing the ground of slugs.

We have never known a solution of soap, fine earth, and water to fail of protecting the plant from the ravages of the cut-worm or any other insect that makes depredations upon it, if applied at suitable intervals of time, to parts liable to be devoured. Tobacco will destroy lice on cabbages.

Storing Cabbages.—"The preserving of cabbages during the winter is all that remains to be treated of under the word cabbage; but, as every reader must know, it is a matter of great importance, for on it depends the supply of cabbages for four months in the year north of Virginia and south of Boston, and for six months in the year when you get as far north as the province of New Brunswick. The cellar is a poor place; the barn is worse. The cabbages get putrid parts about them.

If green vegetables be not fed from the earth, and be in an unfrozen state, they will either wither or rot. Nothing is nastier than putrid cabbage, and one rotten cabbage will communicate its offensiveness to a whole parcel. Pits you cannot open in winter. To turn the heads down and cover them with earth while the root stands up in the air is liable to the same objection. The cabbages are pretty safe, but you cannot get at them during the winter. I have tried all the ways that I ever saw practiced, or that I ever heard of, and the following method I found to answer every purpose. It is the surest preservation, and gives the least trouble, whether in the putting together or in the taking away for use. Lay out a piece of ground, four feet wide, and in length proportioned to your quantity of cabbages to be preserved. Dig on each side of it a little trench a foot deep, and throw the earth up on the four-feet bed. Make the top of the bed level and smooth. Lay some poles or old rails, at a foot apart, longways upon the bed. Then put some smaller poles or stout sticks crossways on the rails or poles, and put these last at five or six inches apart. Upon these lay cornstalks, broom-cornstalks, or twigs or brush of trees, not very thick, but sufficiently thick just to cover all over. Make the top flat and smooth. Then, just as the frost is about to lock up the earth, take up the cabbages, knock all dirt out of their roots, take off all dead or yellow-looking leaves, and some of the outside leaves besides; put the cabbages head-downward upon the bed, with their roots sticking up, and cover them with straw so thick as for the straw to come up nearly to the root of the cabbage. Do not pack them quite close. It is better if they do not touch each other much. Lay some bits of wood, or brushwood, to prevent the straw from blowing off. If the frost catch you before you have got the cabbages up, cut them off close to the ground, and let the stumps, instead of the roots, stick up through the straw. Out of this stack you will take your cabbages perfectly green and good in the spring, when the frost breaks up; and to this stack you can, at all times in the winter, go, with the greatest facility, and get your cabbages for use, which you can to no other species of conservatory that I ever saw or heard of. The hollow part below the cabbages takes away all wet that may come from occasional rains or meltings of snow, and the little ditches on the sides of the bed keep the bed itself free from being soaked with wet. Even if deep snows come and lie for months, as in Nova Scotia, New Brunswick, and Canada, it is only removing the snow away, and there are the cabbages, always fresh and good. Immense quantities, particularly in woody countries, may be stacked and preserved in this way at a very trifling expense. In fields the side trenches would be made with the plow. Poles, in such a case, are of all sizes, always at hand; and small brushwood might do very well instead of straw; fir-boughs, laurel-boughs, or cedar-boughs would certainly do better than straw; and where is the spot in America which has not one of these three? Cabbage stumps are also to be preserved, for they are very useful in the spring. You have been cutting cabbages to eat in October and November. You leave the stumps standing, no matter what be the sort. Take them up before the frost sets in, trim off the long roots, and lay the stumps in the ground, in a sloping direction, row behind row, with their heads four or five inches out of ground. When the frost has just set in in earnest, and not before, cover the stumps all over a foot thick or more with straw, with corn-stalks, or with evergreen boughs of some sort. As soon as the breaking-up comes, take off the covering and stir the ground, as soon as dry, by hoeing among the stumps. They should be placed in an *early spot*—in one of the warmest places you have—and they will give you—at New York—an abundance of fine greens toward the end of April, when a handful of wild dock-leaves sells in New York market for sixpence—York money—which is rather more than an English threepence. Lastly, as to the saving of cabbage seed. The cabbage is a biennial. It brings its flower and its seed the second year. To have cabbage seed, therefore, you must preserve the cabbage, head, root, and all, throughout the winter, and this must be done either in a cellar or under covering of some sort out of doors—for the root must be kept in the ground all winter. It is possible, and I think likely, that seed from the stump is just as good as any; but as one single cabbage will give seed enough for any garden for three, four, or five years, the little pains that the preservation can require is not worth the smallest risk. As to the quantity of cabbages wanted for a family, it must depend on its size and on their taste."*

Special manures—salt, wood-ashes, plaster, and bone-dust.

Profits of the Culture.—It is known that in the neighborhood of large cities cabbages are cultivated on a large scale to supply their markets. When this is done, there may be about six thousand plants to the acre, although each cultivator will follow his own judgment in that matter. A few years since there was published an account of a cabbage-field cultivated upon the farm of Lambert Wyckoff, in Bushwick, on Long Island. The field contained sixteen acres. The sod was turned over in the fall, and cross-plowed in the spring. Fifty cart-loads of street manure from New York were put on an acre, at a cost of forty cents per load, delivered on the farm, and the whole cost of cultivation was ten dollars per acre; so that the whole expense of manure and cultivation was $480. The product of the field was sixty-one thousand one hundred and twenty heads, which were sold for $2,234.77, leaving a net profit of $1,954.77, or $122.17 per acre. In this instance there were only about four thousand heads to the acre.

HOPS.—The hop is a slender climbing plant, which requires a very rich mellow soil and careful cultivation. It is very tender, and the produce is precarious, sometimes giving a great profit to the grower, and at other times failing altogether. The soil of a hop-garden must be rich to a considerable depth, or made so artificially. The subsoil must be dry and sound; a porous, rocky subsoil, covered with two or three feet of good vegetable mould is the best for hops. The exposure should be toward the south, on the slope of a hill, or in a well-sheltered valley. Old rich pastures make the best hop-gardens. They should be subsoiled. A very large quantity of the richest rotten dung, at least a hundred cubic yards per acre, should be well incorporated

* Cobbett.

with the soil by repeated plowings, till it is entirely decomposed and produces that dark tint which is the sure sign of an abundance of humus. The ground should be prepared by laying it up in high ridges before winter, to expose it as much as possible to the mellowing influence of the frost. It is better to be two or even three years in preparing the ground and getting it perfectly clean, than to plant the hops in a foul or unprepared soil.

The young plants are raised in beds, and may be raised from seed; but it is more usual to plant the young shoots which rise from the bottom of the stems of old plants.

Lines are drawn six or more feet apart, and short sticks are inserted into the ground along these lines at six feet distance from each other, so as to alternate in the rows, as is frequently done with cabbage-plants in gardens. At each stick a hole is dug two feet square and two feet deep, which is filled lightly with the earth dug out, together with a compost prepared with dung, lime, and earth, well mixed by repeated turning. Fresh dung should never be applied to hops. Three plants are placed in the middle of this hole six inches asunder, forming an equilateral triangle. A watering with liquid manure greatly assists their taking root, and they soon begin to show bines. A stick three or four feet long is then stuck in the middle of the three plants, and the bines are tied to these with twine or the shreds of Russia mats, till they lay hold and twine round them. During their growth the ground is well hoed and forked up around the roots, and some of the fine mould is thrown around the stems. In favorable seasons a few hops may be picked from these young plants in the autumn, but in general there is nothing the first year. Early in November the ground is carefully dug with the spade, and the earth being turned toward the plants, is left so all the winter.

In the second year, early in spring, the hillocks around the plants are opened and the roots examined. The last year's shoots are cut off within an inch of the main stem and all the suckers quite close to it. The suckers form an agreeable vegetable for the table, dressed like asparagus. The earth is pressed round the roots, and the cut parts covered so as to exclude the air. A pole about twelve feet long is then firmly stuck into the ground near the plants; to this the bines are led and tied as they shoot till they have taken hold of it. If by any accident the bine leaves the pole, it should be carefully brought back to it, and tied till it takes hold again. A stand-ladder should be at hand to do this when the bine has acquired some height. The ground being well hoed and the earth raised round the plants, the produce this year will average four hundred weight per acre if the season is favorable.

Some hop-planters plow up or dig the ground before winter; others prefer doing it in spring, in order not to hasten the shooting, which weakens the plants. The same operations of pruning the shoots, manuring, and placing poles, which were performed the preceding year, are carefully repeated. Particular attention is paid to proportion the length of the poles to the probable strength of the bines; for if the pole is too long it draws up the bine and makes it bear less; if it is too short, the bines entangle when they get beyond the poles, and cause confusion in the picking. In September, the flower containing the seed will be of a fine straw-color turning to a brown; it is then in perfection. When it is overripe it acquires a darker tint. No time is now lost, and as many hands are procured as can be set a picking; great numbers of men and women go out of the towns in the hopping season, and earn good wages in the hop plantations. During the picking they sleep in barns and out-houses. In the picking the poles are taken down, and the stems cut three feet from the ground; if they were cut shorter it would weaken the root, by causing it to bleed. The poles are laid sloping over a frame of strong wood nine feet long and four feet wide, supported by legs three feet high; this is called a bin. A piece of coarse cloth is fixed to this frame by hooks, so as to form a bag, which does not reach the ground. Three men or women, or four boys or girls, are placed on each side of the bin and pick the hops from two places at a time. Where they are very careful of the quality of the hops, as at Farnham, they divide them into three sorts: the green, which are not quite ripe; the light yellow-brown, which are in perfection; and the very dark, which are past their prime. Some go even farther, and make several qualities according to color and fragrance; for this purpose there are several baskets. The dew should be off entirely before they begin, for otherwise the hops might become musty or take too long drying, and lose their fragrance. The hops when picked are dried on a hair cloth in a kiln. When they appear sufficiently dry at bottom they are turned; it is however thought by some hop-driers that the turning of the hops is apt to injure them, and that it is best not to do so; but in order that the upper part may be dried equally with the lower, a wooden cover lined with tin plates is let down over the hops on the hair cloth to within a few inches of the surface; this reverberates the heat and the whole is dried equally. The heat must be carefully regulated in order that it may not alter the color. When the leaves of the hops become brittle and rub off easily they are sufficiently dried. They are then laid in heaps on the floor, where they undergo a very slight heating. As soon as this is observed they are *bagged*. This is done through a round hole twenty-five or thirty inches in diameter, made in the floor of the loft where the hops are laid. Under this hole is a bag, the mouth of which is drawn through the hole and kept open by a hoop to which it is made fast. The hoop is somewhat larger than the hole, and the bag remains suspended; a handful of hops is now put into each corner of the bag and there tied firmly by a cord. A bushel or two of hops are put into the bag and a man gets into it to tread the hops tight. The bag does not reach the floor below. As the hops are packed by the feet more are continually added till the bag is full. It is now taken off the hoop and filled up with the hands as tight as possible. The corners are stuffed as soon as the mouth is partly sewn up, and tied as the lower corners were; when sewed close and tight it is stored in a dry place till the hops are wanted for sale.

The crop of the third year will average eight hundred weight per acre. In some very extraordinary seasons, on good land, fifteen hundred weight have been picked per acre: in Flanders, where they manure with urine and the emptyings of privies, this is not an uncommon produce.

THE HOP-TREE.

Persons who have paid no attention to the subject of hop culture have no idea of its importance as a branch of rural economy or of commerce. About fifty-two thousand acres of land in Great Britain are appropriated to this object. Even the duty on the article in that country for the year 1846 amounted to nearly five hundred thousand pounds sterling, the quantity of hops on which it was charged amounting to over fifty million pounds. The crop of hops in the United States for several years past has been estimated at about ten thousand bales, six-tenths of which are exported, and the balance used for home consumption. The price varies in different years according to the demand and the supply. The average price may be given at twelve cents the pound.

TURNIPS.—This well-known plant is cultivated for its bulbous roots both in the garden and the field. As a culinary root it has been prized from the earliest times, and many varieties have been .cultivated for the table; but it is those of a larger kind, cultivated in the fields, which form so important a part of the most improved systems of agriculture on all light soils, that the success of the farmer is in general proportioned to the quantity of turnips raised on his farm. They are the great foundation of all the best systems of cropping, by supplying the manure required for the subsequent crop, and, at the same time, clearing the land of all noxious weeds, by the numerous plowings, stirrings, and hoeings which they require.

In order to have a heavy crop, especially of Swedish turnips, or *ruta baga*, it is advisable to sow the seed early, that is, in the beginning or middle of June. They will then have the advantage of the summer showers, and be beyond the reach of the fly in a very few days; and when the dry weather sets in, they will already have a supply of moisture in their roots, and the fibers, having struck deep, will not suffer any check. The only inconvenience of sowing early is, that many of the plants are apt to run to seed. This is, in many cases, owing to the seed which is used. If the seed has been raised from fine roots which have stood the winter, there is little danger of the plants running to seed in the first summer; but, as is often the case, if small imperfect roots are taken, or those which rnn to seed in autumn, then the plants will have a tendency to prodnce seed and not bulbs. The white Norfolk turnip and its varieties should be sown about midsummer, to have a good and heavy crop before winter.

Recent experiments of sowing Norfolk turnips in the Northern states, as late as the 10th of August, in beds, the same as cabbage, and transplanting about the 1st of September, have been attended with the best results. Sown, as here indicated, the plants escape the usual midsummer drought, and are found to do much better than when sown about the 20th of July—a practice which we have borrowed from England, without properly considering the difference between its cool and humid and our very dry and hot midsummer atmosphere. They may be transplanted the same as cabbage, which see.

The distance at which they may be left in thinning them out must depend on the variety, whether it has a wide-spreading top or not. The best crops, both of Swedes and common field-turnips, are generally those where the tops are vigorous and moderately spreading. A small top will not nourish a large bulb; but when the growth is chiefly in the leaves, the bulbs are seldom large.

In its young and tender state it is liable to a variety of accidents. Its great enemy is the turnip-fly (*altica nemorum*), which appears always in great quantities if there is any continuance of dry weather. The more frequently turnips are sown on the same ground the more abundant is the fly; but where the surface has been pared and burned there is seldom any loss from this cause. Many remedies have been proposed for this evil, and some with great confidence. It appears that the fly remains in the state of an egg in the ground, and that it is hatched when exposed to the light and heat of the sun. The time at which it begins to attack the seed-leaves of the turnip coincides with their vegetation; and it has therefore been proposed, with some appearance of reason, to let the insect have the start of the turnips, by leaving the land some time undisturbed before the seed is sown, and carefully cleaning it, so that the insect shall find no food and consequently die. This is supposed to require ten or twelve days to effect. The seed is then drilled and the land rolled; and it is asserted that the ravages of the fly are thus entirely prevented. However this may be, it is generally found that in moist weather the fly does comparatively little harm, as then the vegetation is rapid, and the plant, when once it has put forth its rough leaves, is considered safe. Whatever, therefore accelerates the vegetation, will secure the growth of the turnip. Hence the advantage of dunging the soil before winter, by which means it is enriched uniformly, and a great portion of the manure, having become soluble, absorbs moisture from the atmosphere. In very dry seasons, if water is at hand, it is well worth while to water the newly-sown rows by means of a common water-cart; and if some liquid manure be mixed with the water, the effect will be astonishing. By means of two leathern hose two rows may readily be watered at once; and if the pond or stream be not above half a mile off, a vast extent of ground may thus be watered in one day. Nothing brings on vegetation so fast as diluted liquid manure, care being taken that it be not too strong. The best time for watering is in the evening, or early in the morning; and if in a fine summer's night the water-cart were used before day-light, there would be no great inconvenience to the horse or his driver. It sometimes happens in soils rather compact, that a crust is formed on the surface which has been harrowed fine and rolled, and this impedes the vegetation by excluding the air necessary to germination. In this case no better remedy can be applied than watering, which softens the crust and lets the young plant through. As soon as the turnip-plant has put forth its rough leaves, the intervals between the rows should be stirred with a light plow drawn by one horse. The plow can be made to go within an inch or two of the plants, throwing the earth from the row into the interval: a small harrow, which can be set to any required width, is then drawn between the rows to loosen the earth raised by the plow. This greatly increases the absorption of moisture and invigorates the young plants. They may now be thinned out in the rows by means of a hoe about twelve inches broad, which will hoe out all the superfluous plants, leaving little tufts a foot or more apart. These tufts are thinned out by hand, leaving only one healthy plant in each. Thus the turnips are left at a proper distance, and, having ample room, will soon cover the rows. A horse-hoe is now drawn between the rows to eradicate all weeds and keep the soil open for the fibers of the roots to shoot in. It is not advisable to throw the earth over the turnips, unless it be just before winter, to protect them from the frost; on the contrary, in wet weather the earth is more likely to cause the turnip to rot than to help its growth.

Varieties.—*Early White Dutch* (strap-leaved).—A round, flat turnip, with short, narrow, strap-like leaves, is the earliest kind.

Early Red-Top Dutch (strap-leaved), differs from the preceding only in the red color of the portion of the roots which is above ground. Both of these, in a moist, cool fall, are fit for the table six weeks after sown.

Yellow Dutch will stand any degree of frost uninjured, is fine flavored, and very nutritious. It is of a yellow color, round, handsome shape, firm and sweet, and keeps well. I prefer it to the Swedes for winter use, and would select this, if confined to one kind, for the garden.

White French resembles the Swedes, but not so smooth; flesh white, and exceedingly sweet and excellent; a fine keeper.

Preservation.—Follow the directions given for the winter-keeping of beets—see *beet.*

Special manures—guano, bone-dust, and wood-ashes.

CARROTS.—The large orange carrots, which are the most common for winter provision, are chiefly raised in the fields. When carrots are cultivated in a regular rotation as a principal crop, they are sown in May, on land which has been plowed to a considerable depth before winter, and has had the benefit of the winter's frost. It is not usual to manure the land, but it is best to sow carrots on land which has been abundantly manured for the preceding crop. If it be thought necessary to improve the land by manure, it must be done with well-rotted dung, which should be plowed-in very deep. Without this precaution, the carrots will be apt to *fork*, as it is called; the root being divided will not swell regularly, and instead of being of a fleshy consistence, will become fibrous and hard. The best mode of cultivation is to have the land in a moderately rich state and thoroughly pulverized; to sow the seed in drills, at the distance of a foot or more from row to row; to cover it slightly, and, as the plants appear, to water them with diluted urine or the drainings of dunghills; to destroy all weeds carefully by the hand and the hoe, and to thin the plants in the rows to the distance of five or six inches or more, according to the richness and depth of the soil. Although the carrot, when it grows most vigorously, does not throw out any considerable fibers from the upper part of the root, and appears to draw its chief nourishment from its lower end, yet it is a great advantage to keep the ground stirred and light between the rows; for exceedingly minute horizontal fibers shoot out to a considerable distance from the sides of the root, and tend much to increase its size.

The seed of the carrot has numerous hooked hairs which spring from the husk, and make the seeds adhere together; on this account, carrot seed is usually mixed with earth or sand, and well rubbed in the hand before it is sown. Two pounds of seed are sufficient for an acre, if the seed is drilled; it requires double the quantity if sown broadcast. In this last way very heavy crops are sometimes obtained, but the expense of weeding the carrots by hand is so great, that the drilled crops, besides being more certain, are more profitable. Seed which is two or three years old will vegetate, and it is more essential that it should be ripe and heavy than new. Too much care cannot be taken in selecting good seed. The finest and largest carrots should alone be chosen to plant out in spring to produce seed. They will throw out vigorous stems bearing numerous umbels, which, as the florets fade and the seeds ripen, contract into the form of a bird's nest. Those who are curious in the choice of the seed, take only such seeds as grow on the outer border of the umbel. The tops of the carrots are frequently cut off before they arrive at the full size, as food for cattle and sheep, who are very fond of it; but this is not a judicious plan, as the loss in the growth of the roots from being deprived of the leaves is much greater than the value of the tops as food, especially if they are cut off repeatedly, which is sometimes done when fodder is scarce.

When the plants begin to wither, and the outer leaves to droop to the ground, the tops may be safely mown, and the roots left in the ground. They have then acquired their full growth, and will remain sound in the earth till there is danger from the winter's frost.

The best method of taking up the carrots to store them for winter use is by means of three-pronged forks, such as are used in digging asparagus beds. They should be rather blunt at the point and sides of the prongs, and be stuck into the ground vertically by the side of the rows; by pressing down the handle, the carrots come up without injury. The plow is sometimes used after the coulter has been removed; but with all the care of the plowman, the plow and the horses will cut and bruise many of the finest carrots. Carrots may be kept all winter in dry cellars, if they are protected against the frost. The more common way is to store them with straw in long trenches, like beets. The produce of carrots on good light land is nearly double that of potatoes, and they do not impoverish the land so much. From twenty to forty pounds of carrots, with a small quantity of oats, is a sufficient allowance for a hard-working horse for twenty-four hours. Where hay is scarce, it is a most economical substitute; and where the value of urine is known, carrots are much prized, as they greatly tend to its increase. One bushel of boiled carrots and one of corn are said to be worth as much as two bushels of corn to feed to pigs. They are excellent for feeding horses and milch-cows, and for this purpose are the most profitable of all roots in deep fertile soils.

Special Manures.—Common salt is very beneficial to the growth of the carrot, as are also ashes, plaster, and bone-dust.

THE PARSNIP.—The soil for this vegetable is essentially the same as that for the carrot, and its cultivation and treatment are also the same. The seeds cannot be depended upon for more than one year.

Varieties.—*Guernsey Parsnip*, an improved variety of the common, grows large, and in deep light soils will attain the length of two feet.

Sugar or Hallow Crown.—This is the best variety for garden culture. It is of more uniform growth, has a smoother and cleaner tuber, and is equally as hardy and better flavored than the former, from which it is easily distinguished by the leaves arising from a cavity on the top or crown of the root.

Use.—The parsnip is a very wholesome and nourishing root, though its peculiar sweetish taste is disliked by many persons. It is, however, a very agreeable addition to our supply of winter vegetables. Its fattening properties are great, and it is therefore an excellent root for feeding all kinds of farm stock. Cows fed upon it will yield milk abundantly, and butter of the best quality. Its seeds are sometimes employed in intermittents.

As parsnips contain six per cent. more mucilage than carrots, the difference may be sufficient to account for the superior fattening as well as butter-making qualities of the parsnip. In the fattening of cattle, the parsnip is found superior to the carrot, performing the business with as much expedition, and affording meat of exquisite flavor, and of a highly juicy quality. The animal eats it with much greediness. It is reckoned thirty perches of parsnips, when the crop is good, will fatten an ox three or four years old, in ordinary store condition, in three months. The parsnips are given in the proportion of about thirty pounds' weight, morning, noon, and night—the large ones being split into three or four pieces, and a little hay given in the intervals of those periods. The result of experiment has shown that not only in neat cattle, but in the fattening of hogs and poultry, the animals become fat much sooner, and are more healthy than when fed with any other root or vegetable.

The *special manures* are wood-ashes and bone-dust.

THE GRASSES.—The plants which form the natural sward are not confined to the family of the graminæ, but many other plants, chiefly with perennial roots, form part of the herbage. In the richest soils the variety is exceedingly great. When a sod is taken up, and all the plants on it are examined, the species will be found more numerous than we should have believed possible.

In laying down a field to grass for a very few years, the mode of proceeding is somewhat different from that which is recommended for producing a permanent pasture. Clover in this case is always a principal plant, both the red and the white; these, with annual or perennial rye-grass, are sown with spring-grain, and begin to show themselves before harvest.

The seeds usually sown on an acre, when the land is laid down to grass, are as follows: red clover, twelve pounds; white, six pounds; trefoil, four pounds; rib-grass, two pounds, and two pecks of Pacey's rye-grass. Sometimes cock's-foot grass (*Dactylis glomerata*) and cow-grass (*Trifolium medium*) are added. This is for a field intended to remain four or five years in grass.

Recent experiments have established the value of late fall seeding—say as late as the 20th of November, *and after the ground is frozen hard.* It should previously have been plowed and leveled. The seed vegetates early in the spring, and produces a fine crop the first season. No other than grass seeds should be sown. The increased quantity and vigor of the crop more than compensate for the apparent sacrifice.

The grasses are often mown the first year after they are sown, on account of the abundance and value of the red clover, but the best farmers recommend the depasturing them with sheep, to strengthen the roots and increase the bulk. Various circumstances, such as a greater demand for clover-hay, or for fat cattle, may make mowing or feeding most profitable; but when there is not a decided advantage in making hay, feeding should always be preferred. At all events, the great object of the farmer should be to have his land in good heart and tilth, and free from weeds, when the grass is sown. If his grass is good, he is certain of good crops after it with little trouble or manure.

Another reliable authority* gives the following as the kinds to be sown on the soils named:

The principal grasses for permanent pasture on heavy soil are—meadow fox-tail (*Alopecurus pratensis*); meadow fescue (*Festuca pratensis*); cock's-foot (*Dactylis glomerata*); crested dog's-tail (*Cynosurus cristatus*); rough-stalked meadow-grass (*Poa trivialis*); timothy grass (*Phleum pratense*); perennial rye-grass (*Lolium perenne*); perennial red clover cow-grass (*Trifolium pratense perenne*). For light and medium soils—meadow fox-tail, lark's-foot, meadow fescue, meadow cat's-tail, perennial red clover, white clover.

There should be no penurious saving of seeds, as the whole surface ought to be thickly covered with them. However, three bushels per acre may be set down as the *maximum*; ten pecks is a very sufficient allowance. The proportions in which the seeds should be mixed may be left to the discretion of any seedsman of experience and reputation for integrity and judgment. Some seeds should be sown in greater proportions, such as the rough-stalked meadow-grass, the cock's-foot, the meadow fox-tail, and the meadow fescue, either from their very nutritive properties or early growth, or some other peculiarity of a useful kind. Some, such as trefoil, though good for two years, perish afterward; and yet as intermediate occupiers, until some of the tall and leafy grasses are established, they are useful. In sowing grass seeds, three points are to be specially considered—viz., the length of time during which the land is to be occupied by them, the purpose for which

* Martin Doyle.

the grass land is to be applied, and its condition and quality. On ground intended for permanent pasture, it is obviously unwise to sow short-lived grasses; in such case, the perennials which are found to abound in the best old pastures of soils of analogous qualities should be chosen and proportioned accordingly. Our efforts should be to imitate the bounty of the Creator in supplying the appropriate kinds for a permanent pasture, and to combine the new plants in such proportions as nearly as a careful analysis of the grasses of any given area of good sward will permit. Such good grasses, then, as experience proves to be congenial with the soil, should be selected. Some of the indigenous grasses are the very best. And where there is a strong tendency to their growth, those of good quality will, in the course of time, spontaneously appear, and perhaps struggle successfully with the artificially introduced plants for possession of the soil, and at length constitute an excellent sward when the others have disappeared, from incongeniality of soil or other causes tending to render them but short-lived occupants. "An important law in the natural economy of the grasses governs all those species of most value to the farmer—viz., individual plants of the same species will not grow close to each other for any length of time; for however thickly planted from seed, in one or two seasons intermediate plants decay, and leave vacant places, which are soon filled up with spurious grasses, weeds, or moss; but when a variety of different species, adapted to the soil, are mixed intimately together, they grow close, form a dense bottom, and continue permanent."

Special manures—plaster, lime, and ashes.

THE SUN-FLOWER.—The sun-flower produces a greater quantity of seed than any other plant. It is easily cultivated, and as it forms a valuable food for domestic animals, it should be largely grown by every farmer.

CANADA THISTLES.—To rid a farm of this pest, it is only necessary to understand, and to act accordingly, that no root, however deeply it may permeate the soil, or however hardy it be, can live unless it can produce a plant during the season of growth. Small patches of thistles, therefore, can be destroyed by covering them tightly with board, thus smothering the tops and killing the roots, and larger quantities by such frequent use of the plow and cultivator as shall effectually prevent *any* growth of the tops.

DAISIES.—To get rid of daisies, a careful cultivation with hoed crops for about three consecutive seasons only is necessary—enriching the soil, and, when laid down, let it have about twice the ordinary quantity of seed; and should it so happen, which is rarely the case, that any daisies reappear, none should be suffered to seed.

DEPREDATING ANIMALS, BIRDS, AND INSECTS.

This title is applied to those animals, birds, and insects which injure or destroy the farmer's crop or stock; still it must never be forgotten, that what are depredators in one sense of the word, may in another be beneficial in an equal, or perhaps a greater degree, and that some of the animals, etc., known as vermin, are quite harmless.

Thus, the fox, though he destroys poultry, yet benefits the farmer by his destruction of rabbits; the stoat and weasel repay an occasional chicken killed, or egg sucked, by destroying numbers of mice and young rats. The crow, by the number of wire-worms and other insect vermin it destroys, quite compensates for its occasional injury to our cornfields. The sparrow, although one of the greatest bird-pests, no doubt destroys, especially when feeding its young, numbers of caterpillars. Of those quite harmless, the barn owl, as destroying mice and rats, ought to be encouraged by every farmer. The badger lives principally on wild roots; and the hedgehog, although ridiculously accused of sucking cows in the night, and injuring their dugs, is quite harmless to the farmer, although it may occasionally destroy the eggs of game birds.

The domesticated animals occasionally become the worst of vermin. Thus the dog will destroy more sheep and lambs in one night than the fox would in a year. And the cat, either when gone wild, or in a domesticated state at home, will destroy chickens and pigeons to a great extent, and poach for partridges and rabbits.

The knowing the kinds of vermin by their foot-marks is very useful. One may know what animal is the infesting culprit, by laying some damp and finely-sifted sand or mould in its haunts. A cast for future study and comparison may be taken from this in plaster of Paris. The fox's foot-mark may be known from the dog's, in the former having comparatively no ball to its foot, a female fox less than a male.

Vermin are destroyed by using their natural enemies to kill them, as dogs and ferrets for rats, etc.; taking advantage of their habits and of their appetites, either for food or in the mutual affection of the sexes: thus, by imitating the call of one sex to the other, we attract and catch birds; and by a peculiar method, to be afterward described, the most wary male fox or dog may be caught.

I shall now proceed with the subject, dividing it into animals, birds, and insects.

DEPREDATING ANIMALS.—Among four-footed animals, the rabbit, rat, and mouse, are the most prejudicial to the farmer, yet the fox, mole, etc., etc., are also of this class.

The Fox.—This enemy to lambs and poultry is destroyed in the following manner: five or six circles, about three feet in diameter, are cut in different places, about four inches deep, and refilled with sifted mould. The operator then takes a sheep's paunch, rubs his feet on it to prevent the fox smelling them, ties a string to it, and drags it to each circle of mould; in these he strews several pieces of strong old cheese; after baiting these for three or four days, the fox will boldly trample all over the sifted earth, and where he feeds the freest, set two steel spring-traps, and you will be almost certain to catch him; these traps must be covered with fine mould, and the mould sifted in the traps must not be touched by the hand.

A mixture of nux vomica, dripping, or lard and flour, made into balls, then rolled in honey, and stuck in sticks six inches high, to prevent mice eating them, may be used when the fox will not follow a trail. However, as these are very likely to poison dogs likewise, other means had better be tried. And one of these, which will attract the most suspicious fox, is, when a bitch fox is taken that goes *a-clicketing*, remove the sperm, and mix it with gum-mastic, and keep it in a close vessel, (it may be kept a whole year;) when wanted, take a large piece of rind of bacon, broil it well on a gridiron, and then dip it in the pot, using it as a trail.

The fox is also trailed to a tree, in which the person places himself to shoot him; or to a hook made of large wire, and turning on a swivel, baited with a piece of fresh cheese or liver, and hung so high that he is compelled to leap to it, and thus hooked like a fish.

Badger.—This harmless animal feeds only by night, on pig-nuts, acorns, beech-nuts, and other rubbish; he is caught on a moonlight night, when out for food, by putting a thin sack in his hole, with a running noose at its mouth; one person remains near the hole, and another beats round with a dog; when the badger finds the dog after him, he runs to his hole, and goes into the sack, which slips close like a purse, and the party near the hole pulls him out, by laying hold of the mouth of the sack; this is called sacking the badger. Some place a steel trap in his earths or holes, after testing whether they are used, by first filling them up and seeing whether the badger reopens them.

A pitfall, about five feet deep, and four feet long, narrower at top and bottom than in the middle, is sometimes used; this is covered with small sticks and sheaves.

The dogs for hunting badgers ought to be of a strong bold kind, a cross between the terrier and the bull-dog, and wear tough leathern collars on their necks, as badgers bite very sharp.

Polecat, Stoat, and Weasel, may be taken in wears—that is, spring-traps covered with mould, or the materials where the trap is set, and so surrounded by twigs, bushes, or whatever may not excite suspicion that the animal must tread on the trap to get at the bait; they are also taken in box-traps, and false burrows, or dead falls may be employed for polecats. These are made of a square piece of wood, weighing forty or fifty pounds, with a hole bored in the middle of the upper edge, and a crooked hook placed in it, supported on sticks about twelve inches high, and a bridge at the bottom, so connected with the hook that the animal walking on it disconnects the catch of the drop, and lets it fall on itself; the sides of this trap are so defended by boards or twigs that the animal must walk on the bridge. Weasels and stoats, though sometimes useful in destroying rats and mice, yet, as killing poultry, are also vermin; they may be caught in box-traps, baited with a small bird or egg, or destroyed by placing in their haunts small pieces of paste, consisting of pulverized sal ammoniac, mixed with the white of egg, wheaten flour, and honey.

Strange Cats are sometimes the worst sort of vermin; they may be attracted to a trap by the powder of valerian-root, or pieces of marum or cat-thyme; the bait may be fishes' heads, or a red herring; when caught in a box-trap, use a sack to take them out with, placing the mouth of the sack over the trap, as cats are very fierce when caught, and strike at the person's face with their claws.

Rabbits.—There are three modes of catching rabbits—with fold-nets, with spring-traps, and with types, a species of trap. The fold-nets are set about midnight, about midway between the burrows and the feeding grounds, the rabbits being driven in with dogs, and kept inclosed in the fold until morning. "Types" consist of a large pit or cistern, formed within the ground, and covered with a floor, or large falling door, having a small trap-door nicely balanced toward its center, into which the rabbits are led by a narrow mouth. This trap is set close to the warren wall, where the rabbits scratch to make their escape, or at any single opening in a field of turnips—the mouth being left open, and the trap kept covered with a board for a night or two, to give the rabbits leave to retreat, and get them accustomed to the passage.

Rabbits are, however, generally caught by ferrets, by using muzzled ferrets for their hole, and small purse-nets; keep strict silence, or the rabbits will not start; when they do, they rush into the net, which draws up and catches them. When rabbits will not start, use the lined ferret, *i. e.*, with a line to his neck, and a small bell affixed, so that you can hear where he goes; if the ferret is a stout one, of the half-polecat breed, it will sometimes seize the rabbit, so that they may be both drawn out together; if not, draw the ferret out, and try all the holes; the rabbits will then get together to the lower holes, till they can run no farther; then listen with your ear to the ground, till you hear the ferret or his bell; dig down just before where this sound comes from, and you will catch several rabbits by once digging, whereas otherwise you might have to dig deep for one; in this method the ferret must not be muzzled.

Wolves.—The several varieties of American wolves, as the *common wolf*, the *prairie or barking-wolf*, the *dusky wolf*, and the *black wolf*, are dreaded pests to the pioneers in our new and mountainous regions, often very destructive of sheep and lambs. The American black wolf is the most ferocious and dangerous, though not as wary and sagacious as the prairie-wolf. Hence he is more easily taken by the methods adopted for his capture:

"The ordinary method of capturing wolves is, in winter, by means of a steel trap. It has been found, however, that the most successful method of destroying them is, to drug small sausages with strychnine, or nux vomica, and hang them on the boughs of trees, at such a height that the wolf must leap to obtain them. Under these circumstances, the animal swallows the bait at once, and has not time to find out that it contains any suspicious admixture, which he often does, if the poison be applied to the carcasses of sheep, horses, etc. Another mode of poisoning them is this: the kernels of nux vomica are grated or powdered, then mixed up with three or four times their bulk of fat, or grease, and honey (wolves are very fond of the latter), and made into balls about as large as a hen's egg. These are placed in the woods, covered with a piece of flesh or tripe, and some offal is hung on a tree near the spot, to attract the wolves by its scent. The poison once taken is sure to prove fatal, before the animals can proceed many rods.

"The common and the black wolf are usually destroyed in two ways. When annoyed by them, the farmers frequently unite, and, by a general battue, destroy them. This is effected by forming about the observed retreats of the wolf a large circle of two or three miles in diameter. The hunters gradually close in on the point of hiding, and hedge the wolf in, when he is easily destroyed.

"A frequent means of destruction is a deep pit. This is dug so deep as to prevent the wolf from jumping out, once he is in. The pit is baited with a dead sheep or animal, or carrion. The wolf jumps down for his prey, gorges himself, and then seeks to escape, but in vain. His howlings soon inform the farmer or hunter of his imprisonment, when the pit is visited, and the prisoner killed.

"The prairie-wolf is too sagacious to be caught by traps. He may be poisoned like the other varieties. He is frequently shot. Occupying the open prairie, he is good game for the greyhound, and is often chased by him. Once the greyhound sights him, if in the open prairie, the wolf must be near the cover of a wood, or he has not the least chance of an escape. Being small, a brace of greyhounds soon dispatch him. He may be taken in pits, but is very shy of them."*

The Raccoon is very destructive to plantations of Indian corn and of the sugar-cane, of which it is exceedingly fond. It is a nocturnal animal, and the chief reliance for its destruction is upon well-trained dogs, and night-hunting, though he is easily caught in snares and traps.

Squirrels.—The main reliance for the destruction of the different squirrels is the dog and gun.

Rats.—There are three species, the common gray Norway rat, the black, or old English; and the water-rat; the first is by far the most common and most mischievous.

Poisoning rats (as well as mice) is a common method, but not to be recommended; the many accidental deaths caused by poisons, and willful ones, in which the poison is bought under the pretense of poisoning rats, ought of itself to cause this method to be laid aside, as there are others far better, and quite as efficacious.

In poisoning, there is the risk of destroying other animals who accidentally find it, as dogs and cats; and even when the poison is so carefully laid that this risk is avoided, the dead bodies of the rats may be eaten by cats, or hogs, as their death is never instantaneous, as, after poisoning, rats and mice have a burning thirst, which leads them to drink; even human beings may be poisoned by the animal drinking of milk, beer, or water, and vomiting into it. The poisonous effluvia caused by the dead rats is another reason why it should not be employed in houses.

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* "Pests of the Farm."

Rats are caught in the box-trap, so placed in a baited hutch, with holes in each end, that the rats make this hutch a place of feeding and resort *before* the trap is set, traveling over the bridge of the trap (then prevented from falling,) to get the food; others advise the use of a small cask, one-fourth filled with water; this cask, covered with a skin of parchment, on which the rats are fed for some days, then this skin is slashed across the middle in three or four places, and the rats fall into the water below, and are drowned.

But the best trap is the common spring-trap, laid in their runs without any bait, and well covered with fine mould, or laid in the entrances to their holes in stacks, and covered with chaff; if two or three dozen are thus laid in a night, the effect will soon be seen. In buildings, where the rats get to meal, cover the traps with bran; they will trample this about seeking for food.

The wire cage trap, with falling doors, and wired apertures, less at the inside than externally, is sometimes useful, as catching several at a time alive; but rats are very suspicious of any iron substance.

The following are excellent receipts for enticing rats, and catching them alive. To entice, use oil of rhodium, twenty drops; oil of anise, ten drops; musk, one grain; and dress the trap or cage with a feather dipped in this composition. To catch rats alive, bait with malt, ground very fine, one pound; loaf-sugar, finely powdered, quarter of a pound; oil of anise, ten drops; made into a paste, and small portions placed within the trap or cage, and dropped along from the holes to the trap.

If rats must be killed by the food they eat, give what I may call the *mechanical* poisons, which will be harmless to larger creatures eating it. Thus:—try cork, ground into a coarse powder about a quarter the size of a grain of wheat, or cut as thin as sixpences, with lard or suet; or use bits of sponge soaked in grease, and then dipped in honey; or use a composition of plaster of Paris, ground malt and loaf-sugar, in which the plaster of Paris is the largest ingredient; this must be given quite dry, and when eaten by rats, forms into a cement in their bowels, and causes them to die.

When rats and mice have lodged behind wainscots, the best means of driving them out is by fumigation; for this purpose, put some common salt into a table-spoon, pipkin, or any other vessel, and pour upon it a small portion of sulphuric acid. By introducing this mixture into a hole in the wainscot, so much suffocating gas is produced, as to cause their almost immediate expulsion. But, after all, the terrier-dog and ferrets are the only means of keeping down rats on a farm.

For those who prefer using poison, the phosphoric pill, giving light as well as death, and Harrison's rat pills may be recommended.*

Mice.—There are two kinds, the common mouse and the field-mouse; the ranny, or shrew-mouse, is quite a different species. For the common mouse, a supply of good cats is the best remedy; for preventing their getting into stacks, use stack-pillars; but supposing that the stacks have no pillars, and abound in mice—as mice live without leaving the stack, by licking the ends of the straw for water, while rats must leave

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* See "The Family."

it for this purpose—then take a quarter of a pound of nux vomica, boil it with three quarts of water to two quarts, add two pounds of treacle to overcome the bitterness of nux vomica, and place it under the eaves in small earthen pans; the mice being in want of water will greedily drink of this, and be destroyed. This is better than dressing the stacks, which I have seen to be quite inefficacious, the stacks swarming with vermin, and the composition removed untouched on taking in the stacks. Dressing is performed by putting lumps of a mixture made of arsenic, or carbonate of barytes, as the poison, oil of anise as the attraction, and lard as the mixing ingredient, on bits of stick, and setting them in numbers round the eaves of the stack.

In gardens, use a large flower-pot sunk in the soil, with the bottom laid on a slate well baited with malt, or the common figure-of-four trap, baited with a bean, and with a tile or slate for a fall.

Mole.—Opinions vary as to whether this little animal is injurious or not. In pastures some consider him beneficial, as draining the soil, and raising fine earth to the surface, which, if spread, and not allowed to lie in heaps, would manure the soil. In arable land or gardens they are, however, a great nuisance; and if the earth-worm assists our drainage, then the destroyer of earth-worms is no benefit. Some have recommended placing slices of leek, garlic, or onions, in their haunts, and assert that they have such an antipathy to these as to leave their burrows directly, and be taken. Others recommend poisoning them with a mixture of nux vomica, and dead, though fresh, earth-worms.

The mole-trap consists of a flat piece of board, about four and a half inches long, and two and a half wide, at each end of which a semicircle of ash is placed. This trap is placed in their runs, two nooses of wire are placed neatly within the ashen bows, and come out through a small hole in the upper board, till they are fastened to a string, which, by means of a bent stick, acts as a spring; now to keep this stick down, and act as a trap, there is a central hole in the board, in which the end of this string, with a knot in it, is passed and kept in its place by a short piece of forked stick. The mole passes through the bows and the wire noose, finds the forked stick in his way, displaces it with his fore-feet, which releases the stick, and causes one of the nooses to catch the mole by the body. The place for setting the traps is known by pressing down the runs with the foot, and seeing in a day or two whether the mole has been through and repassed them. Young moles are quite white when born, and white full-grown moles are occasionally seen. The fur of the mole is like velvet, and I have heard of an instance of a mole-catcher making himself a frock-coat of the skins.

DEPREDATING BIRDS.—Having noticed most of the four-footed depredators, I now come to those of the bird kind.

The carnivorous birds, as kites, hawks, carrion-crows, ravens, etc., are far less nuisances to the farmer than the innumerable graminivorous tribes; some of them, as the owl, are quite beneficial.

When one of the larger birds is killed, instead of nailing it against the barn-door, it should be put on a stake, with its wings extended, in the place infested by others of its species.

Kites, hawks, and magpies, are caught by fastening down the bait;

for hawks, a young rabbit stuffed; for kites, a chicken or a piece of carrion; for magpies, an egg. Place the bait, firmly fastened down, *between* two well covered-up traps, (for if placed on the bridge of the trap, it would only catch the bait,) and then the bird will, in endeavoring to get the bait away, and trampling about, be caught in one of the traps set for him. Magpies, when caught, make a screaming noise, which attracts others of the same species, when they may be shot from a place of concealment.

A curious method is said to be successfully practiced for catching carrion crows, and, by substituting pease for meat, to be equally efficacious in catching wild pigeons. Dig small holes in the ground, and put small pieces of cartridge paper, twisted in a conical shape, in each hole. Put a small piece of raw meat in the end of the paper, and rub the inside of the paper well with bird-lime. The crows, attracted by the smell of the meat, put their heads into these holes, and are unable to extricate them from the paper, they therefore fly about with it on their heads, and are easily knocked down or shot.

"Crows have been employed to catch crows, by the following stratagem:—a live crow is pinned by the wings down to the ground on his back, by means of two sharp, forked sticks. Thus situated, his cries are loud and incessant, particularly if any other crows are within view. These, sweeping down about him, are instantly grappled by the prostrate prisoner, by the same instinctive impulse that urges a drowning person to grasp at every thing within his reach. Having disengaged the game from his clutches, the trap is again ready for another experiment; and by pinning down each captive, successively, as soon as taken, in a short time you will probably have a large flock screaming above you, in concert with the outrageous prisoners below. Many farmers, however, are content with hanging up the skins, or dead carcasses, of crows in their cornfields, *in terrorem:* others depend altogether on the gun, keeping one of their people supplied with ammunition, and constantly on the look out."*

But it is the corn and fruit eating birds that are so injurious, although we allow that as eating the seeds of weeds, and as destroying many insects, they benefit as well as injure.

Scares of different kinds are employed to keep them off in fields; figures of men, and the dead bodies of the depredators, if rooks. In gardens, by covering the beds with fishing nets, or branches of fir, a slender rod of hazel, six or eight feet long, set in the ground in a slanting direction, with a potato stuck full of feathers hung from one end, is an excellent scare, as are also strings of worsted of various colors, or strings with feathers fastened at close intervals, fixed about six inches high, close together over the beds.

But the gun and constant attention are the general and best resource.

A wholesale poisoning with nux vomica, in which wheat has been steeped forty-eight hours, is sometimes had recourse to.

Wood Pigeons are another kind of vermin very destructive to peas, and other crops; they may be shot from a place of concealment in the field

* "Pests of the Farm."

to which they resort, leaving the dead ones on the field, as a lure to others, till the day's destruction is over, and the shooter leaves his retreat.

Larks are also very destructive to young wheat; they may be shot during snows, as they are then plainly seen congregated in large flocks, and let the shooter approach nearer than at other times; they are also sometimes netted by means of a large net and a tame hawk; this plan is not often practiced on account of the game.

DEPREDATING INSECTS.—Insects form the third section of this article. They may be divided into those attacking or infesting stock, as the gadfly in oxen, bots in horses, and maggots in sheep, and those attacking crops.

To both these classes we shall allude briefly.

The Striped Turnip Beetle (*altica nemorum*) is a minute jumping insect, which devours the turnip leaves on their first appearance. As the moment they are disturbed they leap off the plant, they are difficult to destroy. Fresh painted or tarred boards have been recommended to be drawn close over the turnips, so that those little insects jump on it, and are thus caught. Mr. Paul recommended a triangular kind of bag-net, formed of strong glazed calico, and supported by two pieces of stout stick, in a triangular form, strewing it before him on the ground, over the tops of the turnips, so that the insects fall into the bag; during the process the bag may occasionally be shaken, so as to bring them to the bottom of the bag. A small patch of white turnips may be sown to allure these insects from the Swedes, and the bag used with these.

A plan that has been successfully adopted, is to sow a plant that they prefer to the general crops; leave this first plant altogether to the beetles or flies. In Swedes, rows of white turnips are sown; in white turnips, rows of mustard; this plan has been found very efficacious, as the flies congregate on their favorite food, and before this is devoured, the main crop has grown out of danger.

The Black Jack, or Nigger, the caterpillar of the *tenthredo centifolice*, is another pest to the turnip crop, and devours the whole of the leaf in a more advanced state than the turnip fly does.

The means of destroying it is, to drag a cart-rope over the field, which shakes many of them off the plant, and so bruises them that they die; or better use an axletree upon wheels, armed with green furze, or a bushed hurdle dragged along the rows; but the best methods of all are hand-picking, and sending in numbers of ducks, the latter the best, as less expensive; they should be driven to water several times a day, when they will vomit up the dead caterpillars they have devoured, and go to work again with a fresh relish. It is curious to see them waddling along in the rows, regarding each side of the turnip leaf with attentive eye; a small quantity of corn should be given the ducks when returning home at night, to obviate the effects of their rich diet.

Aphides of different species attack various crops, one species attacks our peas and beans, another our turnips, and a third our hops, and a fourth is supposed by some to have been the primal cause of the potato disease, and hence called *aphis vastator*.

The best cure for these in all plants is to top the affected portions, in peas or beans, and cut off the affected leaves in turnips, carry them away and burn them. In beans this is an easy task, as the plant lice congregate in the extreme end of the shoots, and a man with a scythe can top a large space a day. This plan also improves the quantity and quality of the bean. Dusting with pulverized lime has been advocated for destroying the aphis; and this plan has proved tolerably successful; for hops a peculiar dusting implement is used. Tobacco smoke is used in garden practice; and occasionally for farm operations, with a proper fumigating apparatus on a large scale. The larva of the lady-bird lives entirely on aphides.

The Cockchafer, midsummer dor, or May-bug, is extremely destructive both in its perfect and larva state.

As a beetle it sometimes appears in such numbers as to devour every green thing, and swarm in enormous numbers. They remain quiet in trees during the day, but come out during the night; their buzzing noise and blind headlong flight are well known to all. To destroy them, drive swine and poultry to the trees on which they hang, and shake and beat the trees; the swine, etc., will feed on those that fall, and if in sufficient numbers, grow fat on this food.

The Grub, or Caterpillar, destroys the roots of grain and other plants; whole acres of pastures are thus rendered unproductive. The turf dies, and may be rolled up as if pared, and under this the larva is found curled up in fine mould of about an inch in depth. The best remedy is to remove the turf, and turn in swine, ducks, and poultry, which devour the larva; the grub remains such for four years; or the surface may be pared and burnt, or stable urine be used from a water-cart, which not only destroys the grubs, but improves the land. Blackbirds, crows, etc., are exceedingly fond of these grubs, and devour them in spring, in great numbers. Late autumnal and early spring plowings, by exposing these and other similar insects, as the wire-worm and cut-worm, etc., to a low temperature, are the most easy and certain means for their destruction. A second stirring of the soil, if practicable, before it freezes, so effectually rids it of these pests that they are comparatively harmless.

The Wire-Worm.—This name is applied to grubs of different kinds, but the true wire-worm is the larva of the click beetle (*elater segetis*) which continues in the ground, before it takes its perfect state, for the space of five years, being a year longer than the grub. During the time it is underground, it commits most extensive ravages, feeding on wheat, rye, oats, barley, and attacking and piercing the larger roots, as carrots, parsnips, and potatoes. It is particularly destructive in newly broken-up land.

A heavy clod-crusher has been found to stop its ravages in wheat-fields; and on a small scale, slices of potatoes or carrots may be placed in the ground, with a small skewer through them to force them in, and mark the place; examine them every day, and remove and destroy the wire-worms, which collect on them in great numbers.

Slugs are another destructive pest. To destroy them, roll the fields affected in the night, when they feed, or quite early in the morning; this will crush many of them.

Or by strewing sliced turnip-roots and leaves over the young growing blade of wheat, and removing them occasionally, when they will be found with many slugs beneath them. A small quantity of fresh lime may also be sown over the fields when the slugs are out.

Weevils, which attack wheat and other grain, may be destroyed or prevented by frequently turning the grain and exposing it to the sun and air. At a temperature below 50° the sexes do not pair, and a heat of 78° kills them, if they are *feeding*, and one of 167° will kill them in the grain. A room heated to 135° by hot-water pipes has been used with great success. Fleeces laid on corn heaps are said to attract and kill the weevil. Setting the windows of an empty granary open during a frost for two or three nights will expel them.

In London they preserve corn and malt by white-washing the granaries, and frequently turning and stirring the heaps.

The Wheat Midge is a minute insect, which lays its eggs in the florets of wheat, these devour the pollen, and render the floret unproductive; they are found in great numbers in the dirt from the chaff of wheat.

The best way to destroy them would be to separate the dust and larvæ from the chaff by a sieve, and then destroy them by fire. Happily there are other minute insects which destroy these larvæ by laying their eggs in them, and thus prevent much of their mischief.

OF INSECTS INJURIOUS TO LIVE-STOCK.—The horse is annoyed by the horse-bee (*œstrus equi*), and the gad-fly (*el hœmorrhoidàlis*); the first deposits its eggs on such parts of the body as are liable to be licked by the tongue, and the animal unconsciously conveys them into its stomach, where they become whitish, rough maggots, known by the name of bots. They attain full size in May, and are voided in June. On dropping to the ground, they change into chrysalides, and in six or seven weeks the fly appears. The female lays her eggs on the inside of the horse's knee. The other species is still more troublesome; it deposits its eggs upon the hips, and causes very great uneasiness to the horse. Bots may be beneficial to cattle, as acting as perpetual blisters or stimuli, when not in too great numbers. The farmer should *prevent* bots, leaving it to the veterinary surgeon to cure them. The first is effected by watching the animal at the season the female deposits her eggs (usually August and September), and if the horse appears much agitated in the pasture, examine it, and remove the eggs with a pair of scissors, or a brush and curry-comb. If bots exist in the horse, fasten a bag-net on, to catch the excrement and full-grown larva. Throw the dung into a deep pit, so that the insects may not work their way to light again.

There are other dipterous insects which feed upon the blood both of horses and cattle, as the horse-flies, and other flies still smaller, which assail him during summer, and dart their long proboscis into his legs and belly. But none are more trying to him than the forest fly (*hippobosca equina*), which runs sideways or backward like a crab, and shelters itself in those parts best covered with hair; it may be caught by the hand while the animal is in the stall; but its substance is so hard that it can only be destroyed by rolling it between the finger and thumb.

Horned Cattle are subject to the attacks of a peculiar gad-fly (*el bovis*), which causes them great terror and distress. Oxen in yoke, when attacked, become unmanageable. The eggs are deposited within the skin. The flies only attack young and healthy subjects, but independently of the terror they create, do not appear to occasion any material injury.

Sheep are also infested by a gad-fly (*el ovis*) which deposits its eggs in the inner margin of their nostrils. The moment the fly touches this part, the sheep shake their heads and strike the ground violently with their fore-feet, holding their noses close to the ground and crowding together. The larvæ are white; they inhabit the cavities of the maxillary sinuses, and crawl, when the animal is dead, into those of the horns and frontal sinuses; when full grown, they fall through the nostrils, and change to a chrysalis, which produces the fly in about two months.

Swine, pigeons, and all kinds of poultry are subject to fleas and lice of various kinds, but never to such a degree as to occasion death.

Apple-Moth.—In many sections of the country this has become a very destructive insect, nearly annihilating the valuable apple-crop of large districts. "This insect is readily distinguished from other moths, by the large oval brown spot, edged with copper color on the under margin of each of the fore-wings." They lay their eggs on the young fruit the last of June and throughout July. They are deposited on the blossom end of the fruit, having a preference for early over late fruit, from the greater tenderness of its skin. The worms are hatched in a few days, and find their way into the fruit. The effect is, to diminish its growth, to cause it to ripen prematurely, or to fall when only partially grown. The worms soon leave the fallen fruit, and hide themselves beneath the bark, eating a cavity to suit their shape. Here they form their cocoons, from which they emerge in the shape of moths the following summer, to renew the same round of depredation. The habits of the insect point out two modes for its destruction—the prompt gathering and destruction of all prematurely fallen fruit—swine will do this effectually if running beneath the trees—and by carefully scraping off the loose bark from the trunk and large branches, and by washing them with a solution of tobacco and lye.

Apple-Tree Borer.—This insect leaves the trunks of the trees, in the form of a beetle, early in June. It flies only in the night, lying quietly during the day amongst the leaves and branches on which it feeds. During the months of June and July it deposits its eggs in the night-time on the bark near the roots. The grub works its way through the bark, and bores a cylindrical passage just beneath the bark upward, casting its own offal and borings out of its entrance. During the two or three years in which it remains in the larvæ state, it will have ascended eight or ten inches, when it eats its way out about the first of June, and commences its work in the form of a beetle. Pointed wires in the path of the grub are a simple and efficient mode of destruction.

Peach-Tree Borer.—The eggs of this insect are deposited during the summer in the bark of the tree, near or just beneath the surface of the ground, and the presence of the insect is very easily detected by the exuding gum. It is not difficult to destroy them; they are easily taken out with a knife, and if ashes be packed firmly about the roots of the tree in spring, and removed in autumn, and the tree examined in the spring and midsummer, no farther difficulty will be met.

DOGS—THE BEST BREEDS.

Dogs are quite generally kept in both town and country; and as there is a great difference in breeds, as to the profit and pleasure which they are capable of affording their owners, it is certainly important to know which, in those respects, are the most valuable.

THE SHEPHERD-DOGS AND THE TERRIERS are quite generally considered as the best varieties. Buffon, the eminent naturalist, thus spoke of the shepherd-dog:

"This animal, faithful to man, will always preserve a portion of his empire and a degree of superiority over other beings. He reigns at the head of his flock, and makes himself better understood than the voice of the shepherd. Safety, order, and discipline are the fruits of his vigilance. They are a people submitted to his management, whom he conducts and protects, and against whom he never applies force but for the preservation of good order. . . . If we consider that this animal, notwithstanding his ugliness, and his wild and melancholy look, is superior in instinct to all others; that he has a decided character, in which education has comparatively little share; that he is the only animal born perfectly trained, for the service of others; that, guided by natural powers alone, he applies himself to the care of our flocks, a duty which he executes with singular assiduity, vigilance, and fidelity; that he conducts them with an admirable intelligence, which is a part and portion of himself; that his sagacity astonishes, at the same time that it gives repose to his master, while it requires great time and trouble to instruct other dogs for the purposes to which they are destined; if we reflect on these facts, we shall be confirmed in the opinion that the shepherd's dog is the true dog of nature, the stock and model of the whole species."

The *American Agriculturist* gives the following characteristic illustration:

"The master of the bitch purchased at a fair some eighty sheep, and having occasion to stay a day longer, sent them forward, and directed his faithful Colley to drive them home, a distance of about seventeen miles. The poor bitch, when a few miles on the road, dropped two whelps; but, faithful to her charge, she drove the sheep on a mile or two farther—then, allowing them to stop, she returned for her pups, which she carried some two miles in advance of the sheep, and thus she continued to do, alternately carrying her own young ones, and taking charge of the flock, till she reached home. The manner of her acting on this occasion was gathered by the shepherd from various persons who had observed her on the road."

The following genial and happy view of the comparative merits of the shepherd and terrier dogs, from the pen of Lewis F. Allen, we take pleasure in laying before our readers:

"We always loved a dog; and it almost broke our little heart, when but a trudging schoolboy, in our first jacket and trowsers, our kind mother made us take back the young puppy that had hardly got its eyes open, which we one day brought home, to be kept until it was fit to be taken from its natural nurse. We are now among the boys, John, Tom, and Harry; and intend to give them the benefit of our own experience in this line, as well as to say a few words to the elder brothers—and fathers, even—if they do not turn up their noses in contempt of our instruction, on a subject so much beneath their notice.

"We say that we love dogs: not *all* dogs, however. But we love some dogs—of the right breeds. There is probably no other civilized country so dog-ridden as this, both in

'Mongrel, puppy, whelp, and hound,
And curs of *low* degree.'

"Goldsmith, kind man that he was, must have been a capital judge of dogs, like many other poetical gentlemen. Still, other men than poets are sometimes good judges and great lovers of dogs; but the mass of people are quite as well satisfied with one kind of dog as with another, so that it be a dog; and they too often indulge in their companionship, much to the annoyance of good neighborhood, good morals, and, indeed, of propriety, thrift, and common justice. Of all these we have nothing to say—here, at least. Ours is a 'free country'—for dogs, if for nothing else. Nor shall we discuss the various qualities, or the different breeds of dogs for sporting purposes. We never go out shooting; nor do we take a hunt—having no taste that way. Perhaps in this we are to be pitied; but we are content as it is. Therefore we shall let the hounds and pointers, and setters, and springers, and the land and the water spaniels, all alone. The mastiffs, and the bull-dogs, too, we shall leave to those who like them. The poodle, and the little lapdog of other kinds also, we shall turn over to the kindness of those who—we are sorry for them, in having nothing better to interest themselves about, —take a pleasure in keeping and tending them.

"We want to mix in a little *usefulness*, as well as amusement, in the way of a dog; and after a whole life, thus far, of dog companionship, and the trial of pretty much every thing in the line of a dog—from the great Newfoundland, of a hundred pounds' weight, down to the squeaking little whiffet of six—we have for many years past, settled down into the practical belief that the small ratting-terrier is the only one, except the shepherd-dog, we care to keep; and of these, chiefly, we shall speak.

"There are many varieties of the terrier. Some are large, weighing forty or fifty pounds, rough-haired, and savage-looking. There is the bull-terrier, of less size, not a kindly, well-disposed creature to strangers, but irascibly inclined, and unamiable in his deportment; still useful as a watch-dog, and a determined enemy to all vermin whatever. Then, again, are the small rat-terriers, as they are termed, weighing from a dozen to twenty pounds; some with rough, long, wiry hair; a fierce, whiskered muzzle; of prodigious strength for their size; wonderful instinct and sagacity; kind in temper; and possessing valuable qualities, bating a lack of beauty in appearance. They are of all colors, but are generally uniform in their color, whatever it be. Another kind still is, the smooth terrier, of the same size as the last; a very pretty dog indeed, with a kinder disposition to mankind, yet equally destructive to vermin, and watchful to the premises which they inhabit, or of whatever else is put under their charge. The fidelity of the terrier to his master is wonderful; equal, if not superior, to any dog whatever. In courage and perseverance, in hardihood, and in feats of daring, he has hardly an equal; and in general *usefulness*, no dog can can compare with him.


THE SCOTCH TERRIER.

"Sir Walter Scott, who was a great friend to dogs, as well as a nice and critical judge of their qualities, used to tell this story:—When a young man, first attending, as an advocate, the Jedburgh assizes, a notorious burglar engaged Sir Walter to defend him on his trial for housebreaking in the neighborhood. The case was a hard one; the proof direct and conclusive; and no ingenuity of the defense could avoid the conviction of the culprit. The matter was settled beyond redemption; and before he left for his imprisonment, or transportation, the thief requested Sir Walter to come into his cell. On meeting, the fellow frankly told his counsel that he felt very grateful to him for his efforts to clear him; that he had done the best he could; but the proof was too palpable against him. He would gladly reward Sir Walter for his services; but he had no money, and could only give him a piece of advice, which might, perhaps, be serviceable hereafter. Sir Walter heard him, no doubt, with some regret at losing his fee; but concluding to hear what he had to say: 'You are a housekeeper, Mr. Scott. For security to your doors, use nothing but a common lock—if rusty and old, no matter; they are quite as hard to pick as any others. (Neither Chubbs' nor Hobbs' *non-pickable* locks were then invented.) Then provide yourself with a small rat-terrier, and keep him in your house at night. There is no safety in a mastiff or bull-dog, or in a large dog of any breed. They can always be appeased and quieted, and burglars understand them; but a terrier can neither be terrified nor silenced; nor do we attempt to break in where one is known to be kept.' Sir Walter heeded the advice, and, in his housekeeping experience, afterward, confirmed the good qualities of the terrier, as related to him by the burglar. He also commemorated the conversation by the following not exceedingly poetical couplet:

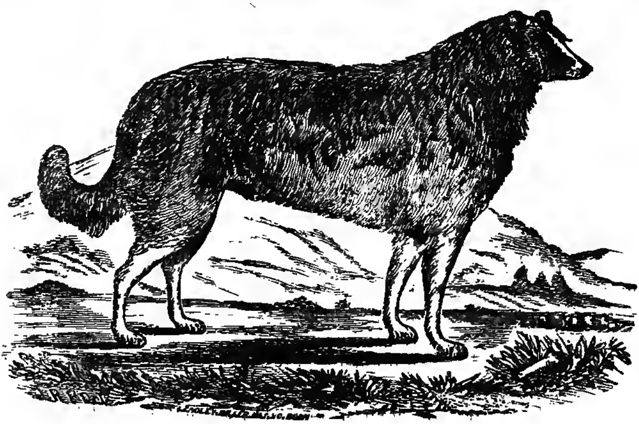
'A terrier dog and a rusty key,
Was Walter Scott's first Jedburgh fee.'

"The terrier has a perfect, thorough, unspeakable instinct for, and hatred to all kinds of vermin. He takes to rats and mice as naturally as a cat. He will scent out their haunts and burrows. He will lie for hours by their places of passage, and point them with the sagacity of a pointer at a bird. He is as quick as lightning, in pouncing upon them, when in sight, and rarely misses them when he springs. A single bite settles the matter; and where there are several rats found together, a dog will frequently dispatch half a dozen of them, before they can get twenty feet from him. A dog of our own has killed that number, before they could get across the stable-floor. In the grain-field, with the harvesters, a terrier will catch hundreds of field-mice in a day; or in the hay-field, he is equally destructive. With a woodchuck, a raccoon, or any thing of their size—even a skunk, which many dogs avoid—he engages, with the same readiness that he will a rat. The night is no bar to his vigils. He has the sight of an owl, in the dark. Minks and weasels are his aversion, as much as other vermin. He will follow the first into the water, till he exhausts him with diving, and overtakes him in swimming. He is a hunter, too. He will tree a squirrel, or a raccoon, as readily as the best of sporting dogs. He will catch, and hold a pig, or any thing not too large or heavy for him. He will lie down on your garment, and watch it for hours; or by any thing else left in his charge. He will play with the children, and share their sports as joyfully as a dumb creature can do; and nothing can be more affectionate, kind, and gentle among them. He is cleanly, honest, and seldom addicted to tricks of any kind.

"We prefer the high-bred, smooth, English terrier, to any other variety. They are rather more gentle in temper, and very much handsomer in appearance, than the rough-haired kind; but perhaps no better in their useful qualities. We have kept them for years; we keep them now; and no reasonable inducement would let us part with them. A year or two ago, having accidentally lost our farm terrier, and nothing remaining on the place but our shepherd-dog, the buildings soon swarmed with rats. They were in and about every thing. During the winter, the men who tended the horses and cattle, at their nightly rounds of inspection before going to bed, would kill, with their clubs, three or four, in the barns and stables, every evening. But still the rats increased, and they became unendurable. They got into the grain mows, where they burrowed, and brought forth with a fecundity second only to the frogs of Egypt. They gnawed into the granaries. They dug into the dairy. They entered the meat barrels. They carried off the eggs from the hen-nests. They stole away and devoured, the young ducks and chickens. They literally came into the "kneading-troughs" of the kitchen. Oh, the rats were intolerable! Traps were of no use. Arsenic was innocuous—they wouldn't touch it. Opportunity favored us, and we got two high-bred, smooth English terriers—a dog and a slut. Then commenced such a slaughter as we seldom see. The rats had got bold. The dogs caught them daily by dozens, as they came out from their haunts fearless of evil, as before. As they grew more shy, their holes were watched, and every morning dead rats were found about the premises. The dogs, during the day, pointed out their holes. Planks were removed, nests were found, and the rats, young and old, killed, *instanter*. Hundreds on hundreds were slaughtered, in the first few weeks; and in a short time, the place was mostly rid of them, until enough only are left to keep the dogs "in play," and to show that in spite of all precaution, they will harbor wherever there is a thing to eat, and a possible place of covert for them to burrow."

To have the terrier in full perfection, it is important that the breed be *pure*. We are so prone to mix up every thing we get, in this country, that it is sometimes difficult to get any thing exactly as it should be; but a little care will provide us in this particular. He should be properly trained, too, when young; that is, to mind what is said to him. His intelligence will be equal to all your wants in the *dog* line; but he should not be *fooled* with. His instincts are *sure*. And, with a good education, the terrier will prove all you need in a farm, and a watch-dog. We speak from long experience and observation.

The shepherd-dog is another useful, almost indispensable, creature on the sheep or dairy farm. To the flock-master he saves a world of labor in driving and gathering the flocks together, or from one field, or place,



THE SHEPHERD-DOG.

to another. To the sheep-drover, also, he is worth a man at least; and in many cases can do with a flock what a man cannot do. But for this labor he requires training, and a strict, thorough education by those who know how to do it. He is a peaceable, quiet creature; good for little else than driving, and on a stock farm will save fifty times his cost and keeping every year. He is a reasonably good watch-dog, also; but he has neither the instinct nor sagacity of the terrier in that duty. To keep him in his best estate for his own peculiar work he should not be troubled with other labors, as it distracts his attention from his peculiar duties. We had a remarkably good dog of this kind a few years since. He was worth the services of a stout boy in bringing up the cattle and sheep until an idle boy or two in the neighborhood decoyed him out in "*cooning*" a few nights during one autumn, in which he proved a most capital hunter, and after that he became worthless as a cattle dog. He was always rummaging around among the trees, barking at birds, squirrels, or any live thing that he could find; and no man could coax him back to the dull routine of his duty. A shepherd-dog should never go a hunting.

We would not be understood as condemning every thing else excepting the dogs we have named for farm use. The Newfoundland and the mastiff are enormously large dogs, and possessed of some noble qualities. They have performed feats of sagacity and fidelity which have attracted universal admiration; but, three to one, if you have them on your farm they will kill every sheep upon it; aud their watchfulness is no greater than that of the shepherd-dog or the terrier. We have spoken of such as we have entire confidence in, and such as we consider the best for useful service. There are some kinds of cur dog that are useful. They are of no *breed* at all, to be sure, but have now and then good qualities; and when nothing better can be got they will do for a make-shift. But as a rule we would be equally particular in the *breed* of our dog as we would in the breed of our cattle or sheep. There are altogether too many dogs kept in the country, and most usually by a class of people who have no need of them, and which prove only a nuisance to the neighborhood and a destruction to the goods of others. Thousands of useful sheep are annually destroyed by them; and in some regions of the country they cannot be kept by reason of their destruction by worthless dogs, which are owned by the disorderly people about them. In a Western state, some time ago, in conversing with a large farmer who had a flock of perhaps a hundred sheep running in one of his pastures, and who also kept a dozen hounds for hunting, we asked him whether the dogs did not kill his sheep? "To be sure they do," was his reply, "but the dogs are worth more than the sheep, for they give us great sport in hunting deer and foxes, and the sheep only give us a little mutton now and then, and some wool for the women to make into stockings!" This is a mere matter of taste, thought we, and the conversation on that subject dropped. Yet this man had a thousand acres of the richest land in the world, raised three or four hundred acres of corn a year, fed off a hundred head of cattle annually, and sold three hundred hogs every year for slaughtering!

The Uses made of the Dog.—In the remotely northern parts of the world the half-savage natives train dogs to draw them and their goods, in sledges, over ice and snow; they are forced to travel over vast tracts in a single day, with great loads, during the long winter, on scanty fare, and then cruelly dismissed in summer, to provide what food they can for themselves.

The Greenland dogs are large, and resemble wolves; they are mostly white, with a black face; sometimes varied with black and white. They seldom bark, but growl savagely; their lodging is in the snow, in which they lie covered up, with their noses alone peeping out. If at liberty, they hunt for themselves, in packs, such game as the rigorous climate affords. In this generally wild state, and never treated with kindness, it is no wonder that they should be very different in their habits and appearance from our domesticated dogs.

In Germany, the poorer peasantry keep dogs for the purpose of drawing vegetables and other articles to the markets, in little carts, which are often so badly constructed and so overloaded, that the poor animals suffer sadly from the ill-treatment and abuse they receive. Four or five gaunt and miserable dogs are yoked together, and compelled, by the force of the cudgel, to drag the man or woman who guides them, in addition to the farm produce, which of itself is a heavy load.

In Brussels, however, some noble-looking dogs, of a large breed, may be seen under a baker's or milkman's cart, and apparently well treated.

Happier, comparatively, is the dog in some countries, where he is kept in a fat, sleek, and idle condition, in preparation for the table. We read that in some islands in the Pacific Ocean dogs are fatted as food for the savage natives, who only do, or did, what the Romans of old did, and the Chinese, even of modern times, are said to do. Sucking-puppies are dainties with this people: and the flesh of a grown dog was pronounced by a wise physician of old to be as good as mutton or pork, wholesome and strengthening.

The shepherd's dog has the peculiarly watchful and vigilant disposition of his race, so necessary for the shepherd's purpose, which is to use him as an assistant in keeping the flock together, enabling him to conduct or drive them from one field to another, or along the high-road to fairs or markets, or to wedge them up so closely that he can catch any of them when he pleases.

In short, the dog serves better than a boy as an assistant to him, is far more active in collecting the sheep or keeping them within a limited space, which he does by perpetually running backward and forward, and barking, when necessary, to quicken the attention of the sheep.

The sagacity with which he distinguishes any one of the flock under his care from sheep of another flock is surprising. If one has strayed into another flock, suppose in a crowded sheep-fair, or among other flocks encountering each other on any occasions, he singles out the straying or confused sheep from any number of others, and forces it back to its own flock; a look, word, or motion of the hand from his master is sufficient.

I have seen a shepherd, in a clover-field of many acres, step off a certain square portion, his dog observing his movements within the boundaries thus lightly traced by his steps; the sheep were restrained by the vigilant dog, who did not suffer one of them to encroach on the clover outside the almost imaginary limits, until they had completely eaten off the prescribed portion, and the shepherd thought fit to allow them a fresh bite.

In the Highlands of Scotland, the shepherd's colly, as the small sheep-dog there is called, has often shown great sagacity in discovering sheep buried deeply in snow-drifts, and without any apparent sign of their being in those places.

Mr. Andrew Laidlaw, of St. Mary's Loch, states the circumstances under which he himself was discovered under a snow-drift by his sheep-dog, when no human creature was able to do so.

He had been looking after some sheep on the very high hills above his farm-house, toward evening, when snow had fallen heavily over a spot which had been frozen; his feet slipped, he slid down on his back under a covering of snow, and could not rise up on account of the slippery bottom. In a few minutes he lost all consciousness, and remained about fourteen hours in what would have been the sleep of death, but for the sagacity of his dog, which the next day accompanied a party in search of him. The dog scraped the snow over the place where his master's head was imbedded in it.

The shepherd everywhere passes much of his time with no other companionship than that of his faithful, submissive dog, and yet he too frequently seems insensible to the affectionate and trustful conduct of the dog; he often speaks gruffly to him, lets him suffer great thirst during the drought of summer, in dry places where there is no water, rather than take the trouble of bringing a dish of water to the parched sentry, who has no shelter from the sun's rays, and he grudgingly gives to him a very scanty morsel, regardless of the humble, supplicating look of the poor brute.

I have rarely noticed an exception to this insensibility on the part of the shepherd, who seems to be more feared than loved by his dog, for he seldom notices him with kindness.

The Mastiff.—This is the right dog for the farm-yard. Being very large, strong, and a loud barker, he is a first-rate watch-dog. Indeed, almost all dogs, except over-fed and over-fat lapdogs, are vigilant, and ready to give warning-note of strangers prowling about at night. For the mere purpose of arousing farmer or cottager to perception of danger at night, any ordinary dog is useful; but the mastiff is pre-eminently the right sentinel in the farm-yard.

He is too strong and brave to be trifled with by thieves.

When Great Britain was under the dominion of the Romans, the emperors of Rome used to send for English mastiffs to fight at the bloody and detestable combats in the amphitheater.

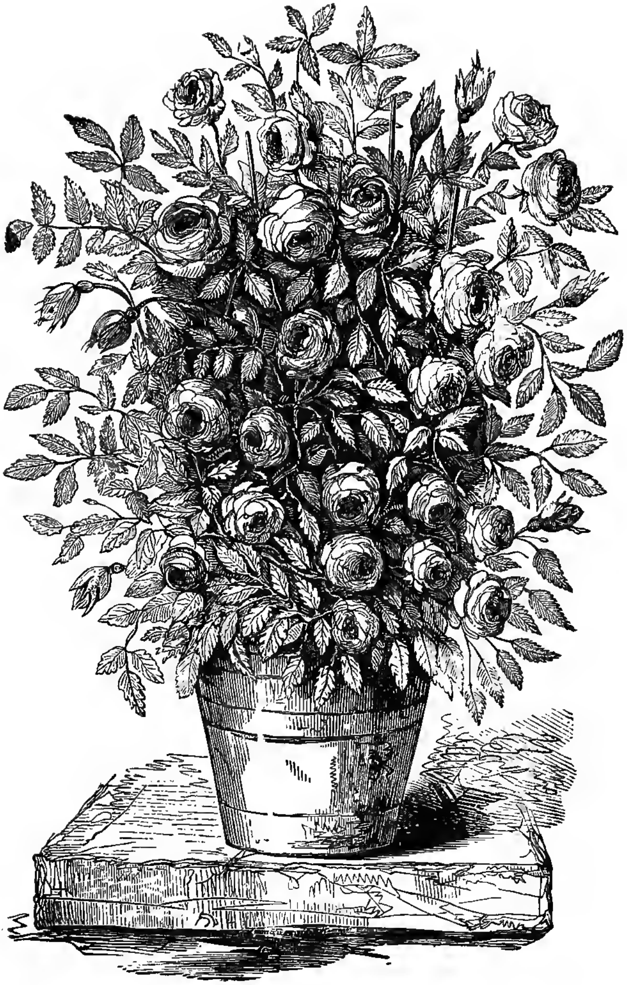
A man who keeps a mastiff solely as a watch-dog, ought to keep him chained up, as he is disposed to be fierce and dangerous to strangers; and, like dogs generally, very ready to snap at the ragged beggar, upon whom the whole world is so apt to frown. This is an unaccountable instinct, but it is plainly observable.

The French peasantry have always in their yards some sort of house or shelter for their watch-dog, whose chain is often fixed to the root of a tree, round which he revolves at will, barking at every strange footstep, and from habit (it may be hoped) taking pleasure in the noise and bustle he is perpetually creating.

It is certainly painful to see poor animals tied continually to one spot and separated from their own kind; but on the other hand, it is better than to run the risk of being bitten by dogs at large, and having them prowling about, as in Ireland, in all directions, and in such cases kept by poor laborers, who have neither property to be guarded nor food for the curs which multiply about them.

The dog is a carnivorous animal naturally, yet the Irish poor have not even a bare bone to throw to the household dog; and in most instances, they do not let him even partake freely of the limited quantity of vegetable food provided for their pigs and poultry. He more frequently receives a kick and a blow than a mouthful of food, and is, on the whole, a pitiable and useless animal.

So numerous are they, through the absence of any restriction, that a French traveler observed, in a book which he published, that a large number of dogs were kept in each village and along the road-sides of Ireland, in order to accelerate the pace of the mail-coaches and carts, which they did by pursuing and barking at the horses' heels from stage to stage. The simple-minded man believed this.



THE KITCHEN-GARDEN.

We shall take up little space in considering the situation or form of the kitchen-garden. Every body knows that the best situation, where any choice can be had, will be selected; that the farms will be as variant as the owners, and the soil the best furnished by the locality. These subjects, therefore, need not occupy our space, or the reader's time. It is of more importance to know how to improve the soil, to cultivate and plant it properly, at the right seasons, and with the proper vegetables. These subjects will be illustrated as we consider *what vegetables and fruits to cultivate, and the best methods of their cultivation.*

PREPARATION OF THE SOIL.—General Hints.—To prepare your ground, it will be necessary to trench, manure, and dig it, till it becomes thoroughly broken and incorporated, and of a temperament sufficiently porous to allow the wet to pass freely through it.

When thus prepared, divide and lay out your ground to the best advantage; generally speaking, if you have walls, a border all round, of three, or four, or ten feet (according to the size of the whole piece of land), with a walk next, and then the remainder allotted into regular compartments, or quarters, for the principal crops, is found the best way of laying out a kitchen-garden; but if it be only inclosed by a hedge, it is by far the best to make a walk all round against the inside of the hedge.

The soil of a garden should be frequently pulverized or broken, by proper digging, in order that it may be sweet, free, and rich, or no great things can be expected as to forward, well-flavored, handsome productions. The soil should be sweet, that the nutriment which the roots receive may be wholesome; free and light, that they may be at full liberty to range in quest of it; and rich, that there may be no defect in food.

It must be remembered that vegetables cannot, like the animal creation, range from place to place in search of food; they can grow only where planted—consequently they must be supplied by different means with food, and that according to their different habits and constitutions.

Trenching and pulverizing the soil in autumn and winter (and indeed at all times when the ground is vacant), greatly improves it, and that in proportion to its adhesive texture; being indispensably necessary for strong land, to separate and ameliorate the parts. This amelioration and separation of parts is principally effected by frost, which circumstance may be explained on the principle that the expansion of the water contained in the soil during its freezing increases about one-twelfth its whole bulk, and in its contraction of bulk, during a thaw, leaves the parts so extended that they separate from each other, and so make the soil porous and open to the influence of the sun and air.

The object in pulverizing the soil is to give free and sufficient scope to the roots of vegetables, which should be abundant; otherwise no plant will become vigorous, let the soil in which it is planted be ever so rich. The fibers of the root take up the nutriment they meet with in the soil by absorption, or suction, the end of every fiber having a kind of mouth, termed a sponge-let, which absorbs moisture in the same manner as a very fine sponge, and the quantity taken up does not depend alone on the quantity in the soil, but in the number of absorbing fibers, consequently, the more fibers a root may throw out, the more vigorous does the plant become. Upon the same principle, pulverization is of advantage not only previous to sowing and planting, but is found considerably so during the progress of vegetation, when applied by hoeing in the intervals among the plants while the crop is standing.

The time for sowing or planting is the spring months for the principal crops; but some few kinds require to be sown earlier, and some later, for succession. It is the better way not to keep the same plants always to the same places, but to change their situation in the garden, so as to allow the ground to regain by one kind of crop what it may have lost by another.

Cabbages, cauliflowers, and other plants of the same description, require the soil to be of a rich loamy nature, occasionally well manured with good manure, or enriched with the refuse of a melon or cucumber bed. Vegetable mould, made from decayed or rotten leaves, and general garden refuse heaped together, and occasionally turned till the whole is reduced to a state of black earth, is also excellent for broccoli, savoys, cabbages, cauliflowers, borecole, or the like. Beds of this kind of soil are also well adapted for the rearing of asparagus and artichokes.

Plants of the preceding kinds are principally raised from seed, set early, either in sheltered situations or in a hot-bed, and transplanted when of a sufficient size, the more tender kinds under hand-lights, and the more hardy into the open ground. The seeds are also set late for winter crops, or for succession in spring. They are mostly biennials, and comprise the following in all their varieties: cabbages, Savoys, coleworts, broccoli, borecole, and cauliflowers.

In the summer months, plants of these kinds are particularly subject to the caterpillar's ravages. To prevent this wholly is perhaps impossible; but it is not so difficult to check these troublesome visitors, or even to destroy them. When they appear, water each moderately-sized bed twice a week with a pailful of water in which about a pound of salt has been dissolved. This is an excellent antidote against their ravages, and very seldom fails of effect; if prudently used, it also improves the condition of the plants, and accelerates their growth. Another method is, to scatter the powder of unslacked lime thinly over both plants and beds, which not only destroys those insects but enriches the earth also.

Plants of the spinach tribe are annuals; they require a rich, but rather light soil; the round-leaved should be set in the spring months, and also in the summer for succession; the triangular, or winter kind, in September and October for spring. The green-leaved and the large white beet are also cultivated in similar soil and in a similar manner to spinach, principally for succulent leaves.

Esculent roots, or those of the parsnip, carrot, radish, and potato kinds, should be planted in light, dry, sandy loam, of a sufficient depth to allow the roots to penetrate freely into the earth, and yet sufficiently rich to give it a proportionable bulk. Of these, some are annual, and require fresh planting every year. The esculent roots include the whole of the following, in all their varieties: the beet-root, parsnip, carrot, turnip, salsify, radish, potato, skirret, and Jerusalem artichoke.

Peas and beans are two kinds, dwarfs and runners; they require a good soil, preferring that of a fine loamy nature, and in that kind of earth they thrive well, and yield abundantly. These are annuals, and consequently raised from seed; the more early and hardy kinds are sown in the last two and first two months of the year, either in very sheltered situations, where they can be well protected from the frost and wet, or in frames; the others are sown in succession for constant supplies; thus, by good management, peas and beans, of one kind or other, may be produced during the greater part of the year. The dwarfs require but little management, except hoeing, and the general attention essential to all plants; the runners, on the contrary, must have sticks or supporters, to which they cling, as they sometimes attain to a considerable height.

Broad beans are particularly subject to the fly, or green bug; and when these insects once obtain possession, it is very difficult, if not impossible, to destroy them entirely. Tobacco-water, or salt dissolved in water, as recommended for the destruction of caterpillars on cabbages, has sometimes been found effectual; but the most certain way, and perhaps the only one to be depended on, is to watch their first appearance, and to pick off the part on which they first settle and throw it into the fire or water. This is attended with trouble, it is true; but, generally speaking, this little care is all that is necessary to keep the beans clear of them; for if once they settle on them, they increase so rapidly that in a few days the whole plantation, however extensive, becomes infected, and then all remedies are useless; the loss of the whole crop is certain, and no alternative remains but to cut down every infected plant and commit them all to the flames.

Onions and leeks require a rich, light earth; some are annual, and others are perennial, and, with the exception of the Welch onion, produce bulbous roots, which should be taken up in autumn.

The annuals, which are raised only from seed, are the onion, in most of its varieties, and the leeks. The perennials which are either raised from seed, or propagated by dividing the root, are the shalot, garlic, cives, and tree and potato onion.

Plants of the asparagus and artichoke kinds require beds not only rich but warm; they must also be earthed up, or covered with mats, as it is only the blanched, unexpanded leaves that are eaten; they are tender plants, and will not thrive unless in a rich, warm, moist soil. They are all perennial, and raised by seed, as well as by parting the roots and by cuttings.

Plants of the fruit-bearing kinds require beds similar to the asparagus sorts, and even more attention; some of them, as the melon and several varieties of the gourd and cucumber, do best if started in a hot-bed, and sheltered and attended with the greatest care, from which they may subsequently be removed to the open ground, or a few plants suffered to mature without removal. They are all annuals.

The melon is the most tender, and requires the greatest care; the seeds are usually sown in a hot-bed, and either remain there to fruit, or are transplanted into pots of rich earth, which are set in beds of tanners' bark, and carefully sheltered from the cold and night air; they fruit in August and September.

Gourds, cucumbers, and tomatoes, or love-apples, should be raised in a hot-bed, and transplanted into warm, sheltered situations; they should, for some time after transplanting, be sheltered from frosts during the most inclement weather. But they thrive best, and produce the finest fruit, when suffered to come to maturity in the hot-bed, with the cover raised during the day in the finest weather, and sheltered only during the colder nights.

Capsicums also come under this denomination, being grown for their seed-shells; they should be raised in a well-prepared, rich soil, and sheltered from the cold nights, as the frost easily, and often fatally affects them.

Mushrooms are raised from spawn in a hot-bed; this spawn is a white fibrous matter, found in lumps of rotten dung, horse-mill tracks, horse-rides, in stables, etc. The beds may be made in August or September

The aromatic, or small shrub-like plants, or herbs, as they are usually termed, are raised from seeds, or by parting their roots. They grow best in good, rich, light earth. They should be gathered when in flower, and dried in the shade. They are mostly annuals, and require to be sown in the spring; the perennials should also be sown in the spring, and may be propagated by slips and cuttings, as well as by parting the roots.

Sweet marjoram, summer savory, and basil, are raised from seed only.

Chamomile, winter savory, and tansy, are also raised from seed, but may be increased by parting the roots.

Balm, hyssop, lavender, mint, rosemary, rue, sage, winter savory, and thyme, are all raised from seed in the first instance, but may be propagated by parting the roots, and also by slips, cuttings, and off-sets.

Salads and dressing-plants are, with a few exceptions, all annuals, and require a rich soil, similar to that for herbs; they should be frequently sowed, the early kinds in spring, in hot-beds, and the latter sorts in warm borders. The annual kinds are small salad (for which sow cress, mustard, and radish), cos-lettuce, cabbage, corn-salad, mustard, rape, clary, endive, celery, celeriac or dwarf celery, angelica, parsley, purslane, radish, marigold, chervil, coriander, dill, and radish, and nasturtiums for pickling.

The perennials, the whole of which are raised by seed, and may be propagated by parting the roots, and by slips and cuttings, are tarragon, sorrel, fennel, horse-radish, burnet, and cress.

A rotation, or change of crops, is a matter of much importance, as it is well known to most cultivators that each sort of plant requires a somewhat different nourishment, so that one crop may immediately succeed another; but it should be contrived that a wide crop should follow a close one, and then the contrary.

THE VEGETABLES TO CULTIVATE.—The vegetables appropriate to the kitchen-garden are: artichokes, asparagus, beans, beet, broccoli, cauliflower, cabbage, celery, cress, cucumber, carrot, early corn, egg-plant, endive, Lima beans, lettuce, mustard, melons, okra, onions, potatoes, parsley, parsnips, peppers, pumpkin, peas, radish, rhubarb, salsify, squash, spinach, tomatoes, turnip, pot and sweet herbs.

HOW TO CULTIVATE VEGETABLES.—Care in the Selection of Seed.—The seeds of some vegetables lose their germinating power much sooner than others; and the following summary of the time that seeds may be kept and safely used, can be relied upon, if the seeds are kept from excess of heat, air or dampness.

	Years.		Years.
Artichoke	3	Lettuce	3
Asparagus	4	Mangle-wurzel	10
Balm	2	Marjoram	4
Basil	2	Marigold	3
Bean	1	Melon	10
Bean (kidney)	1	Mint	4
Beet	10	Mustard	4
Borage	4	Nasturtium	2
Broccoli	4	Onion	2
Burnet	6	Parsley	6
Cabbage	4	Parsnips	1
Calabash	7	Pea	1
Capsicum	2	Pennyroyal	2
Caraway	4	Potato	3
Carrot	1	Pumpkin	10
Cauliflower	4	Purslane	2
Celery	10	Radish	2
Chamomile	2	Rampion	2
Chervil	6	Rape	4
Cives	3	Rhubarb	1
Corn	3	Rosemary	3
Corn-salad	2	Rue	3
Coriander	3	Ruta-baga	4
Cress	2	Salsify	2
Cucumber	10	Samphire	3
Dandelion	10	Savory	2
Dock	1	Scorzenera	2
Endive	4	Shalot	4
Fennel	5	Skirret	4
Garlic	3	Sorrel	7
Gourd	10	Spinach	4
Hop	2	Squash	10
Horse-radish	4	Tansy	3
Hyssop	6	Tarragon	4
Jerusalem artichoke	3	Thyme	2
Kale	4	Tomato	2
Kale (sea)	3	Turnip	4
Lavender	2	Wormwood	2
Leek	2		

Saving Seed.—This is a most important branch of the gardener's business.

First, the truest plants should be selected; that is to say, such as are of the most perfect shape and quality. In the cabbage we seek a small stem, well-formed loaf, few spare, or loose leaves; in the turnip, large bulb, small neck, slender-stalked leaves, solid flesh, or pulp; in the radish, high color (if red or scarlet,) small neck, few and short leaves, and long top; the marks of perfection are well known, and none but perfect plants should be saved for seed. The case is somewhat different as to plants, which are some male and others female, but these present exceptions, to be noticed under the names of such plants.

Of plants the early coming of which is a circumstance of importance, the very earliest should be chosen for seed; for, they will almost always be found to include the highest degree of perfection in other respects.

Effectual means must be taken to prevent a mixing of the sorts, or, to speak in the language of farmers, a crossing of the breeds. There can be no cross between the sheep and the dog; but there can be between the dog and the wolf.

There can be no cross between a cabbage and a carrot; but there can be between a cabbage and a turnip; between a cabbage and a cauliflower, nothing is more common; and, as to the different sorts of cabbages, they will produce crosses, presenting twenty, and perhaps a thousand degrees, from the early York to the Savoy. Turnips will mix with radishes and ruta-baga; all these with rape; the result will mix with cabbages and cauliflowers; so that, if nothing were done to preserve plants true to their kind, our gardens would soon present us with little beside mere herbage.

To Test their Soundness.—To avoid the delays which arise from sowing unsound seeds, it is always best to test their soundness, and to ascertain the proportion of good and poor seeds. This may be done either by putting them into warm water, in which, after they are wetted, sound seeds will sink; or by sowing a sample of them in some convenient vessel of moistened earth, which should be kept in a warm place.

Sowing.—The first thing relating to *sowing* is the preparation of the ground. It may be more or less fine, according to the sort of seed to be sown. Peas and beans do not, of course, require the earth so fine as small seeds do. But still, the finer the better for every thing; for it is best if the seed be actually pressed by the earth in every part; and many seeds, if not all, are best situated when the earth is trodden down upon them.

Of course the ground should be good, either in itself, or made good by manure of some sort. But, in all cases, the ground should be fresh; that is to say, it should be dug just before the act of sowing, in order that the seeds may have the full benefit of the fermentation that takes place upon every moving of the earth.

Never sow when the ground is wet; nor, indeed, if it can be avoided, perform any other act with or on the ground of a garden. If you dig ground in wet weather, you make a sort of mortar of it: it binds when the sun or wind dries it. The fermentation does not take place; and it becomes unfavorable to vegetation, especially if the ground be in the smallest degree stiff in its nature.

Fall Sowing.—Some, and indeed many things usually sown only in the spring, may, with advantage, be sown in the fall—as *parsnips, carrots, beets, onions, lettuce, pease,* and all plants that *a slight frost will not cut down.* Care should be taken not to sow early enough to have the plants come up before frosts set in. The seed, in this way, will lie safe all winter, though the frost should penetrate three feet below them When heavy frosts come on, but not before the beds should be covered with straw or litter, kept from blowing away by the most convenient weights, as scantling, rails, planks, etc. We all know what a bustle there is to get in early peas. If they were sown in the fall, they would start up the moment the frost was out of the ground, and would be ten days earlier in bearing, in spite of every effort made by the spring-sowers to make their peas overtake them.

One object of this fall sowing is, to get the work done ready for spring; for, at that season, you have so many things to do at once! Besides, you cannot sow the instant the frost breaks up; for the ground is wet and clammy, unfit to be dug or trenched or trodden upon. So that here are ten days lost. But the seed, which has lain in the ground all the winter, is ready to start the moment the earth is clear of the winter frost, and it is up by the time you can get other seed into the ground in a good state.

How to Sow.—Garden plants should be sown in drills. It facilitates cultivation, and it is, upon the whole, an absolute saving of labor. Where seed-drills are not used, the following simple implement, which any one can quickly make, may be used. Cobbett thus describes it:

"Suppose there be a bed of onions to be sown. I make my drills in this way: I have what I call a driller, which is a rake six feet long in the head. This head is made of white oak, two inches by two and a half, and has teeth in it at eight inches asunder, each tooth being about six inches long, and an inch in diameter at the head, and is pointed a little at the end that meets the ground. This gives nine teeth, there being four inches over at each end of the head. In this head, there is a handle fixed of about six feet long. When my ground is prepared, raked nice and smooth, and cleaned from stones and clods, I begin at the left-hand end of the bed, and draw across it nine rows at once. I then proceed, taking care to keep the left-hand tooth of the driller in the right-hand drill that has just been made; so that now I make but eight new drills, because (for a guide) the left-hand tooth goes this time in the drill which was before made by the right-hand tooth. Thus, at every draw, I make eight drills. And, in this way, a pretty long bed is formed into nice straight drills, in a very few minutes. The sowing, after this, is done with truth, and the depth of the covering must be alike for all the seeds. If it be parsnips or carrots, which require a wider distance between the rows, or cabbage-plants, which, as they are to stand only for a while, do not require distances so wide—in these cases other drillers may be made. And what is the expense? There is scarcely an American farmer who would not make a set of drillers, for six-inch, eight-inch, and twelve-inch distances, in a winter's day; and, consisting of a white-oak head and handle, and of locust teeth, every body knows that the tools might descend from father to son to the fourth or fifth generation. I hope, therefore, that no one will, on the score of tediousness, object to the drilling of seeds in a garden."

Transplanting.—The weather for transplanting, whether of table vegetables, or of trees, is the same as that for sowing. If you do this work in wet weather, or when the ground is wet, the work cannot be well done. It is no matter what the plant is, whether it be a cucumber-plant or an oak-tree. One half of the bad growth that we see in orchards arises from negligence in the planting; from tumbling the earth carelessly in upon the roots. The earth should be fine as possible; for, if it be not, part of the roots will remain untouched by the earth. If ground be wet, it cannot be fine; and, if mixed wet, it will remain in a sort of mortar, and will cling and bind together, and will leave more or less of cracks, when it becomes dry.

If possible, therefore, transplant when the ground is not wet; but here again, as in the case of sowing, let it be dug, or deeply moved, and well broken, immediately before you transplant into it. There is a fermentation that takes place immediately after moving, and a dew arises which did not arise before. These greatly exceed, in power of causing the plant to strike, any thing to be obtained by rain on the plants at the time of planting, or by planting in wet earth. Cabbages and ruta-baga (or Swedish turnip) I have proved, in innumerable instances, will, if planted in freshly-moved earth, under a burning sun, be a great deal finer than those planted in wet ground, or during rain. The causes are explained in the foregoing paragraph; and there never was a greater, though most popular error, than that of waiting for a shower in order to set about the work of transplanting. In all the books that I have read, without a single exception; in the English gardening books; in the English Farmers' Dictionary, and many other works on English husbandry; in the Encyclopædia; in short, in all the books on husbandry and on gardening that I have ever read, English or French, this transplanting in showery weather is recommended.

If you transplant in hot weather, the leaves of the plants will be scorched, but the hearts will live; and the heat, assisting the fermentation, will produce new roots in twenty-four hours, and new leaves in a few days. Then it is that you see fine vegetation come on. If you plant in wet, that wet must be followed by dry; the earth, from being moved in wet, contracts the mortary nature—hardens first and then cracks—and the plants will stand in a stunted state till the ground be moved about them in dry weather. If I could have my wish in the planting of a piece of cabbages, ruta-baga, lettuces, or almost any thing, I would find the ground perfectly dry at top; I would have it dug deeply; plant immediately; and have no rain for three or four days. I would prefer no rain for a month to rain at the time of planting.

This is a matter of primary importance. How many crops are lost by the waiting for a shower! And when the shower comes, the ground is either not dug, or it has been dug for some time, and the benefit of the fermentation is wholly lost.

However, there are some very tender plants, plants so soft and juicy, as to be absolutely burnt up and totally destroyed, stems and all, in a hot sun, in a few hours. Cucumbers and melons, for instance, and some plants of flowers. Those which lie in a small compass must be shaded at least, if not watered, upon their removal.

In the act of transplanting, the main things are, to take care not to bury the heart of the plant; and to take care that the earth be well pressed about the point of the root of the plant. To press the earth very closely about the stem of the plant is of little use, if you leave the point of the root loose. I beg that this may be borne in mind; for the growth, and even the life of the plant, depend on great care as to this particular.

Cultivation.—The ground being good, and the sowing or planting having been properly performed, the next thing is the after-management, which is usually called the cultivation.

If the subject be from seed, the first thing is, to see that the plants stand at a proper distance from each other; because, if left too close, they cannot come to good. Let them also be thinned early; for, even while in seed-leaf, they injure each other. Carrots, parsnips, lettuces, every thing, ought to be thinned in the seed-leaf.

Hoe or weed immediately; and, let me observe here, once for all, that weeds never ought to be suffered to get to any size either in field or garden, and especially in the latter. In England, where it rains or drips sometimes for a month together, it is impossible to prevent weeds from growing. But in this fine climate, under this blessed sun, who never absents himself for more than about forty-eight hours at a time, and who will scorch a dock-root or a dandelion-root to death in a day, and lengthen a water-melon shoot twenty-four inches in as many hours; in this climate, scandalous indeed it is to see the garden or the field infested with weeds.

But beside the act of killing weeds, cultivation means moving the earth between the plants while growing. This assists them in their growth. Mere surface-hoeing only keeps down the weeds. The hoeing when the plants have become large should be deep. If any body will have a piece of cabbages, and will dig between the rows of one half of them twice during their growth, and let the other half of the piece have nothing but a flat-hoeing, that person will find that the half which has been digged between, will, when the crop is ripe, weigh nearly, if not quite, twice as much as the other half. But why need this be said in an Indian-corn country, where it is so well known, that without being plowed between, the corn will produce next to nothing.

Garden Rotation.—The same species of plants should never be grown in successive crops upon the same ground. The most beneficial plan is where exhausting and non-exhausting crops alternate with each other, as after manure, viz.:

Onions, lettuce, cabbage, carrots, manure; or,

Turnips, celery, peas, potatoes, manure.

The following is also a very good rotation:

1. The cabbage tribe to be followed by
2. Aliaceous plants, as onions, leeks, etc., to be followed by legumes, as beans or peas. Peas may be followed the same year with celery.
3. Tap-rooted plants, as carrots, beets, parsnips.
4. Surface-roots, as onions, potatoes, turnips.
5. Celery, endive, lettuce, spinach, etc.

Celery is excellent to precede asparagus, onions, cauliflowers, or turnips; old asparagus-beds for carrots, potatoes, etc.; strawberries and raspberries for the cabbage tribe; cabbage for the tap-rooted plants; potatoes for the cabbage tribe.

In these rotations it is not necessary to apply manure to every crop. For the bulbous roots, as the onion, plants cultivated for their leaves, as spinach and asparagus, the ground can scarcely be too rich, and the bulk of the manures may be applied to them and the cabbage and turnip crops; while for plants raised for seed, it is best that the foliage should not be stimulated into too great luxuriance.

PARTICULAR VEGETABLES.—We now proceed to give special directions for the culture, preservation and use of the several garden vegetables enumerated at the beginning of this article.

Artichoke.—May be raised from seeds, or young suckers taken from old plants in the spring. The best way is to sow the seed early in April, in well prepared soil, in drills one inch deep and twelve inches apart. A cool moist soil suits them best. The plants should be kept free from weeds; and when from nine to twelve inches high should be transplanted into deep and rich soil. The rows should be five feet apart, and the plants two feet distant from each other in the rows. In the north it requires winter protection, which may be given it by dressing the earth around the plants from between the rows, and an addition of a layer of coarse litter. In the spring the litter must be removed and the ground leveled. The strongest stools are left to produce heads and the weaker pinched off. The ground should be dug and manured in the spring. This vegetable is not profitable, and is chiefly grown as a luxury.

Asparagus may be raised by sowing the seed in the fall as soon as ripe, or in March and the early part of April. One ounce of seed will produce about a thousand plants. It requires some of the best ground in the garden. The seed may be sown in drills, ten or twelve inches asunder, and covered about an inch with light earth. When the plants are up, they will need a careful hoeing, and if well cultivated, and kept free from weeds, they will be large enough to transplant when they are a year old. Some keep them in the nursery-bed until they are two years old.

A plantation of asparagus, if the beds are properly dressed every year, will produce good buds for twenty years or more.

New plantations of asparagus may be made in autumn, or before the buds get far advanced in spring, say in February, March, or April, according to situation and circumstances. The ground for the bed must not be wet, nor too strong or stubborn, but such as is moderately light and pliable, so that it will readily fall to pieces in digging or raking, and in a situation that enjoys the full rays of the sun. It should have a large supply of well rotted dung, three or four inches thick, and then be regularly trenched two spades deep, and the dung buried equally in each trench twelve or fifteen inches below the surface. When this trenching is done, lay two or three inches of thoroughly rotted manure over the whole surface, and dig the ground over again eight or ten inches deep, mixing this top dressing, and incorporating it well with the earth.

In family gardens, it is customary to divide the gronnd thus prepared into beds, allowing four feet for every four rows of plants, with alleys two feet and a half wide between the beds. Strain your line along the bed six inches from the alley, the plants to be ten or twelve inches distant in the row, and the rows to be twelve inches apart.

The plants must not be placed flat in the bottom of the trench, but nearly upright against the back of it, and so that the crown of the plants may also stand upright, and two or three inches below the surface of the ground, spreading their roots somewhat regularly against the back of the trench, and at the same time drawing a little earth up against them with the hand as you place them, just to fix the plants in their due position until the row is planted; when one row is thus placed, with a rake or hoe draw the earth into the trench over the plants, and then proceed to open another drill or trench, as before directed; and fill and cover it in the same manner, and so on till the whole is planted; then let the surface of the beds be raked smooth and clear from stones, etc.

Some gardeners, with a view to have extra large heads, place their plants sixteen inches apart in the rows, instead of twelve; and by planting them in the *quincunx* manner, that is, by commencing the second row eight inches from the end of the first, and the fourth even with the second, the plants will form *rhomboidal* squares, instead of *rectangular* ones, and every plant will thus have room to expand its roots and leaves luxuriantly.

In winter, cover them to the depth of three or four inches with rotten manure, to keep the crowns from frost; if in the spring the earth is found to have settled in any part, the deficiency must be made up with more mould. It is a common practice to sow radishes upon the beds, but it is an injurious one, as it robs the ground of a great portion of its nutriment, so essential to their luxuriant growth. The plants are permitted the first two years to run up to stalks, that strong crowns may be formed at their base for the future crop.

After the third year, the beds will require the following mode of treatment. From the middle of October to the end of November give them their winter dressing, which consists in cutting down the stalks close to the ground and clearing the beds from weeds; drawing them off at the same time with a rake into the alleys, to be buried or taken to the compost heap, to be mixed up with other litter and again returned to the soil. Cover the whole of the bed with two or three inches of manure; the alleys must be dug spade-deep, at the same time spreading some soil over the manure on the beds, and leveling the whole evenly. It may be supposed that the annual dressing in this way will in a few years considerably raise the beds; but by the spring forking and raking together, with the hoeing and dressing during summer, a considerable portion of the earth is being continually drawn again into the alleys.

As soon as the frost is fairly out of the ground in the spring, loosen the surface of the beds with a fork, introducing it three or four inches into the soil, turning up the earth with care not to wound the crown of the roots. Then make the surface of the beds even and equal, drawing off the rough earth, stones, etc., into the alleys; finish by stretching a line along the edge of the beds, and trim them neatly off with the spade. Stirring the bed in this manner enables the shoots to rise in free growth; admits the air, rain and sunshine into the ground, and encourages the roots to produce buds of a strong size. A full crop may be expected the fourth season after planting. The proper method of cutting them is to scrape a little of the earth away from each shoot; then, with a sharp-pointed, long-bladed knife, cut off the shoot slantingly, about three inches under the surface, taking care not to wound the younger buds that are advancing below in different stages of growth. It is in the best state for cutting when it is four inches above ground, and while the top remains close and round. The cutting should never extend beyond the middle of June.

BEANS.—Kidney-Dwarfs.—The following are good varieties: early Denmark, early Mohawk, early valentine, early yellow six-weeks, early dun-colored, or quaker, early China dwarf, early Rachel, or quail's head, early Rob-Roy, early Black Dwarf, large white kidney dwarf, white cranberry dwarf, red cranberry dwarf, yellow cranberry dwarf, refugee, or thousand to one, marble Swiss bean, royal dwarf kidney, or French.

English Dwarfs.—Varieties: early Mazagan, early Lisbon, early long-pod, large Windsor, large toker, broad Spanish, Sandwich bean, green Genoa, dwarf cluster, white blossom, green nonpareil, sword long-pod.

Pole or Running.—Varieties: large white Lima, speckled Lima, scarlet runners, white Dutch runners, Dutch case-knife, or princess, London horticultural, French bicolor, red cranberry, white cranberry.

The soil and culture of the different varieties of the bean are essentially the same, except that pole-beans require a greater distance in the hills, and the Limas especially a deeper and richer soil. A soil inclining to clay suits them best, and it should be made rich, notwithstanding the popular error to the contrary.

Beans are often planted too early. They will always grow quicker, and yield better, if the planting be delayed until settled warm weather. The early Mohawk is the hardiest, and may sometimes succeed well, if planted about the middle of April; but it is much safer to delay the planting of any quantity until toward the end of the month.

Beans should not be cultivated when wet with rain or dew, as it causes them to rust. Beans are the most nutritious cf vegetables, yielding eighty per cent. of nutritive matter, while wheat yields but seventy-four.

Beet.—Varieties: early blood turnip-rooted, early long blood, extra dark blood, yellow turnip-rooted, early scarcity, mangel-wurzel, French sugar, or Silesia, Sir John Sinclair's.

This vegetable should be sown in the fall (see *Fall Planting;*) but if not, as soon as the soil is in condition in the spring—the rows a foot apart, and the plants eight inches apart in the rows. In order to hasten the seed up in the spring (if sown then,) soak it four days and nights in rain-water before you sow it. Put it two inches deep, cover it well, and press the earth hard down upon it. Sow the seed pretty thick all along the drill; and, when the plants come up, thin them to eight inches apart. Hoe between the plants frequently; but not very deep, because these tap-rooted things are apt to fork if the ground be made loose very low down while they are growing. There are yellow and white beets, as well as red; but the red is the true kind: the others are degenerate. There is, however, round or turnip-rooted, red beet, which is equally good with the tap-rooted red beet. The ground should be rich, but not fresh dunged. Ashes of wood, or compost mould, is best;

and the digging ought to be very deep, and all the clods ought to be broken into fine earth; because the clods turn the point of the root aside, and make the tap short, or forked. Fresh dung, which, of course, lies in unequal quantities in the ground, invites the tap-root, or some of the side roots to it, and thus causes a short or forked beet, which, for several reasons, is not as good as a long and smooth one. It is always best to thin beets while young. If the tops are used as a vegetable, it should be early, as otherwise they injure those which are to stand, beyond recovery.

Borecole, or Kale.—Borecole, German greens, or Scotch kale, is a very delicate vegetable. It is essential to its perfection that it be fully acted upon by frost before it is cut for the kitchen. There are several varieties of it. The parts used are the top or crown of the plant, with any of the side sprouts. It boils well, and is tender and sweet. The tall and dwarf curly sorts are best adapted for garden culture. Sow the seed in April, along with other cabbage, which transplant and treat in the same manner.

Broccoli.—Varieties: early white, early dwarf purple, early green, dwarf brown, large late purple, large purple cape, white cape, or cauliflower, sulphur-colored cape, branching purple, and large late green.

The several varieties of broccoli and cauliflower may be justly ranked among the greatest luxuries of the garden. They need only be known in order to be esteemed.

The proper time for sowing the seed of purple-cape broccoli is from the tenth to the twenty-fourth of May. Their subsequent cultivation is the same as cabbage.

It has been proved, by repeated experiments, that the purple-cape broccoli succeeds better in our climate than any other variety; and also that, if broccoli or cauliflower-plants be retarded in growth by extreme heat, they seldom arrive at full perfection. It is, therefore, important that the time of sowing the seed of cape broccoli be so regulated as to allow say six weeks of the summer for the plants to grow in, previous to their being transplanted, and about seven or eight weeks between that and the commencement of cool autumn weather, which is essential to mature them.

In this, and more northern latitudes, it is necessary to put these plants into a shed or cellar, to have them during winter. Lift them carefully before severe frost, and plant them in earth. They will head well when thus treated; but south of Virginia this vegetable may be had in perfection without the least trouble excepting the culture. The seed is all imported from Europe.

Cauliflower.—Varieties: early white, late white, hardy red, or purple cauliflower.

Sow at the same time and in the same manner as you sow early cabbages. Treat the plants in the same way; put them at two feet and a half distance; you need not now water them; they will begin to come early in October; and if any of them have not perfected their heads when the sharp frosts come, take them up by the root, hang them up by the heels in a warm part of a barn, or in a cellar; they will get tolerably good heads, and you will have some of those heads to eat at

Christmas. The seed, on account of the heat, is extremely difficult to save in America; but if a fall cauliflower were kept in a green-house during winter, and put out three weeks before corn-planting time, I am persuaded it would bring good seed in June. The quantity of this plant must depend upon the taste for it; but it is so much better than the very best of cabbages, that it is worth some trouble to get it.

Cabbage.—Varieties: early imperial, early dwarf Dutch, early York, early sugar-loaf, early emperor, early Wellington, early heart-shaped, early London market, early London Battersea, large Bergen, or American, late flat German, large green glazed, large late drum-head, red Dutch for pickling, green globe Savoy, large cape Savoy, green curled Savoy, turnip-rooted, in varieties.

The early sorts of cabbages may be forwarded in various ways, either by planting in the fall (see *Fall Planting*) or in a cold frame. But early plants are now more generally raised in hot-beds. They may be transplanted as early as the ground can be worked in the spring, and if hoed often—the oftener the better—will produce cabbage the last of June.

If seed of the large early kinds be sown in a warm border early in April, they will produce plants fit to transplant in May, which will make good cabbages for summer use.

The seed of red cabbage may be sown toward the end of April or early in May, and that of Savoys, and late cabbage in general may be sown at two or three different times, between the middle and the end of May, in fresh, rich ground.

The most certain way of raising good strong plants in the summer season is to sow the seed in a moderately shaded border, in shallow drills drawn three or four inches apart.

To have fine cabbages, of any sort, the plants must be twice transplanted. First they should be taken from the seed-bed (where they have been sown in drills near to each other), and put out into fresh-dug, well-broken ground, at six inches apart every way. This is called pricking out. By standing here about fifteen or twenty days, they get straight and strong, stand erect, and have a straight and stout stem. Out of this plantation they come nearly all of a size; the roots of all are in the same state; and they strike quicker into the ground where they are to stand for a crop. All the larger sorts of cabbages should, about the time that their heads are beginning to form, be earthed up; that is, have the earth from the surface drawn up against the stem; and the taller the plants are the more necessary this is, and the higher should the earth be drawn. After the earth has been thus drawn up from the surface, dig, or hoe deep the rest of the ground. Thus the crop will be brought to perfection.

The best sorts of early cabbage are early York, large York, late York, early nonpareil, early Varick. Of late the early Dutch is the best table variety, while the late Dutch, Bergen, and Savoy are later and larger, though less esteemed varieties.

Celery.—The qualities of this plant are universally known. There are three or four sorts; the white, the red, the hollow, and the solid. The hollow white is the best; but the propagation and cultivation of all are the same. The whole of that part of the year during which the frost is out of the ground, is not a bit too long for the getting of fine celery. The seed sown in the cold ground in April will lie six weeks before it comes up. A wheel-barrow full of hot dung, put in a hole in the ground against a wall, or any fence, facing the south, and covered with rich and fine mould, will bring the seed up in two weeks. If you have a hot-bed frame, or a hand-light, the thing is easy. A large flower-pot will bring up out of ground plants enough for any family. As soon as the plants are three inches high, and it scarcely matters how thick they stand, make a nice little bed in open, free air; make the ground rich and the earth very fine. Here prick out the plants at four inches apart; and, of course, nine in a square foot. They are so very small that this must be carefully done; and they should be gently watered once, and shaded two days. A bed ten feet long and four wide will contain 360 plants; and if they be well cultivated they are more than any common-sized family can want from November till May. In this bed the plants stand till the middle of July, or thereabouts, when they are to go out into trenches. Make the trenches a foot deep and a foot wide, and four feet apart. The bottom, to the depth of four inches, should be made rich by finely rotted manure, and the plants set six to eight inches apart in the row. Water them freely, and shade them for a few days. The soil should be frequently stirred with a small hoe. About the middle of August the earth should be drawn up carefully about the plants, but not to cover their centers. About the first of October the earthing may be done more frequently, say once in two weeks. When two feet high, they are fit for the table. When continued frost is expected, the plants should be covered with dry litter, and a supply for use laid in a bed of sand or earth in the vegetable cellar, where they will keep fresh for several weeks.

Cress is a small salad herb, and is generally used with lettuce, white mustard, rape, chervil, etc. It may be sown very thick in little drills, as should salad seed in general, and cut before it comes into rough leaf. A small quantity in the salad season, which is spring and autumn, may be sown every week in rich ground, free from weeds.

Cucumber.—Cucumbers, melons, etc., are often planted too thick. One plant in a hill is all that should be allowed to mature. One plant will bring more than two, two more than three, and so on, until you have no fruit. The roots of a cucumber, in fine earth, will go ten feet! Let this fact be understood by all our young readers, and we shall soon see finer bearing vines than we have had heretofore. If you wish to have them a month earlier than the natural ground will bring them, do this: make a hole, and put into it a little hot dung; let the hole be under a warm fence; put six inches deep of fine rich earth on the dung; sow a parcel of seeds in this earth; and cover at night with a bit of carpet, or sail-cloth, having first fixed some hoops over this little bed. Before the plants show the rough leaf, plant two into a little flower-pot, and fill as many pots in this way as you please. Have a larger bed ready to put the pots into, and covered with earth so that the pots may be plunged in the earth up to their tops. Cover this bed like the last. When the plants have got two rough leaves out, they will begin to made a shoot in the middle. Pinch that short off. Let them stand in this bed till your cucumbers sown in the natural ground come up; then make some little holes in good rich land, and, taking a pot at a time, turn out the ball, and fix it in the hole. These plants will bear a month sooner than those sown in the natural ground.

Carrot.—For the cultivation of the carrot, see article *Carrot* in *The Farm.*

Corn.—Early corn is so delicious a vegetable that it should by all means have a place in every good kitchen-garden. Its cultivation is, however, so easy and so well understood, that special directions for it need not here be given.

Egg-Plant.—Sow in April, on a warm border where they are to remain; or transplant in June during moist weather. Plant in rows two feet apart, and two feet from plant to plant. The seed will keep three or four years. Sow valentine-beans between the rows.

Select the fruit when at maturity; cut it into slices, and parboil it in a stew-pan; when softened, drain off the water; it may then be fried in batter made with wheaten flour and an egg, or in fresh butter, with bread grated fine and seasoned before it is put in the pan, with pepper, salt, thyme, and such other herbs as may best suit the palate. Some use marjoram, summer savory, parsley, onion, etc.

Endive.—Sow the seed in April, in drills half an inch deep, and about eighteen inches apart; thin out the plants to six or eight inches in the row. The plant produces beautiful blue flowers, and is worthy of a place in the flower-garden. The roots, when dried, roasted as coffee, and ground, may be mixed in the proportion of two ounces of the powder to a pound of coffee.

Lettuce.—Varieties: large green-head, Dutch, or cabbage, tennis-ball, or rose, Madeira, or passion, large green curled, loco-foco—these are hardy kinds: early Silesia, imperial, or sugar-loaf, pale-green, or butter, grand admiral, large summer Silesia, and Paris loaf-coss.

The first six of the above varieties have been tested, and are known to stand our winter. They may be sown from the first to the middle of September; covered with straw as the cold weather sets in, and, transplanted into a warm border as early as possible in the spring, will produce fine heads early in June.

All kinds of lettuce intended for heading should be planted in good ground, twelve inches distant from each other every way; the plants should be carefully hoed every other week during their growth; the first hoeing should be done in about two weeks after they are transplanted.

The coss-lettuce requires to be blanched; this is done by gathering up the leaves of the plants and tying bass round them, when grown to perfection.

Melon.—Varieties: green-fleshed citron, Murray's pine-apple, green-fleshed Persian, green-fleshed nutmeg, large yellow cantaloupe, pomegranate, or musk-scented, Skillman's fine netted, snake (curious).

For the varieties of the musk or cantaloupe melons, prepare a piece of rich ground early in May; manure it and give it a good digging; then mark it out into squares of six feet every way; at the angle of each square, dig a hole twelve inches deep and eighteen over, into which put about six inches deep of old rotten dung; throw thereon about four inches of earth, and mix the dung and earth well with the spade; after which draw more earth over the mixture, so as to form a circular hill about a foot broad at top. When your hills are all prepared, plant in each, toward the center, eight or ten seeds, half an inch deep and a few inches apart. As soon as the plants have made two rough leaves, thin them out, leaving only four to each hill. When each has made four or five rough leaves, pinch the point of each shoot to make the plants branch out and fruit earlier. It also strengthens the vines. Earth up the vines thin, and keep free of weeds. Cotton-batting laid loosely over the young plants, the edges covered with earth, is the best known protection from the striped bug. It also protects them from frosts and cold winds.

Water-Melons.—The culture is the same as the musk-melon, except that they require planting at greater distances. You should leave but one plant in a hill, and should till the ground between the plants while they are growing, until it be covered by the vines. If the plants stand too close, the vines will be weak, and fruit small, thick-rinded, and poor as to flavor.

Okra.—The green capsules of this plant are used in soup, stews, etc., to which they impart a rich flavor, and are considered nutritious. Its ripe seed, if burned and ground like coffee, can scarcely be distinguished therefrom.

This seed should be planted in good, rich ground, the first or second week in May, if settled warm weather, but not otherwise, as it is a very tender vegetable. Draw drills about an inch deep, and three or four feet asunder, into which drop the seed at the distance of six or eight inches from each other, or rather drop two or three in each place, lest the one should not grow, and cover them nearly an inch deep. As the plants advance in growth, thin them out, earth them up two or three times, and they will produce abundantly.

Onion.—Varieties: New England white, large red, yellow or silver skinned, yellow Dutch, Strasburgh or Flanders, Madeira, potato.

Of the several varieties of onions, the yellow, or silver-skinned, and large red, are the best for a general crop. The bulbs are handsome, of a firm growth, and keep well through the winter. The New England white are handsome for the table, and very suitable for pickling, as well as to pull while young, and generally prove a very profitable crop.

The soil cannot be too rich for this vegetable, nor can it well be planted too early in the spring. Indeed, fall planting (see article *Fall Planting*) is generally best. When grown from seed, they should be often lightly hoed, never earthed up, and evenly thinned to eight inches in the row. Yet the best method is the following: sow the onions any time between April and the middle of June, in drills six inches apart, and put the seed very thick along the drills. Let all the plants stand, and they will get to be about as big round as the top of your little finger. Then the leaves will get yellow, and when that is the case, pull up the onions and lay them on a board till the sun has withered up the leaves. Then take these diminutive onions, put them in a bag, and hang them up in a dry place till spring. As soon as the frost is gone, and the ground dry, plant out these onions in good and fine ground, in rows of a foot apart. Make, not drills, but little marks along the ground, and put the onions at six or eight inches apart. Do not cover them with the earth, but just press them down upon the mark with your thumb and fore-finger. The ground ought to be trodden and slightly raked again before you make the marks; for no earth should rise up about the plants. Proceed after this as with sown onions; only observe that, if any should be running up to seed, you must twist down the neck as soon as you perceive it.

Parsley.—The best way is to sow it in spring, and in very clean ground; because the seed lies long in the ground, and, if the ground be foul, the weeds choke the plants at their coming up. A bed of six feet long and four wide, the seed sown in drills at eight inches apart, is enough for any family in the world. But, every body likes parsley, and where the winter is so long and so sharp as it is in this country, the main thing is to keep it through the winter. This may be done by covering the bed six inches thick with long litter *after the ground is frozen*, which must remain until spring; or if some of the roots be taken up early in November and put in a frame or light cellar, the leaves will keep green a long time.

Parsnip.—See *Parsnip* in *The Farm.*

Peppers.—Varieties: grossum, or bell pepper, tomato-shaped, or squash, long red, or bird's bill, cherry, or West Indian, sweet Spanish; used as a salad, has a very delicate taste.

Sow seed in the open ground in May, in drills two feet asunder, and half an inch deep. When the plants are grown an inch or two high, thin them to the distance of fifteen or eighteen inches in the rows. The ground should be afterward hoed deep round the plants, and kept free from weeds by repeated hoeings.

Pea.—See article *Pea* in *The Farm.*

Radish.—Varieties: early scarlet short top; root long and spindle-shaped, leaves very short. It is the earliest, most crisp and mild flavored, and requires less space than the other varieties; salmon: a few days later; not so high colored; otherwise similar to the above; red turnip: named from its shape, and bears the heat better, without becoming hard, but not so good as the above; white turnip: like the last, in every thing except color; yellow summer: this is a turnip-rooted variety, named from its color, and will stand the heat better than any other variety; black winter or Spanish: turnip-shaped, and very large; sown in August or September with turnips. It can be gathered from the ground as desired during the winter.

Those who may be desirous of having good radishes early in the spring, should have a warm border prepared in the very best manner, so as to be ready to sow some of the short top scarlet by the middle of March. If the ground should not be in good condition to receive the seed at this time, let it be delayed a few days; and by the first of April, have another bed prepared in the open ground, by digging in some good strong manure. The seed may be sown broadcast, and raked in evenly, or in drills drawn about one inch deep, and a foot apart.

Rhubarb.—Varieties: Myatt's Victoria, Myatt's Linnæus, (Italian,) Buist's early red and Downing's collossal are the best. Palmatum is the variety the root of which is so extensively used in medicine. It may be grown here as well as in Scotland, India and China. This plant requires a light, deep and rich soil. There is no obstacle to the cultivation of this interesting plant. It will stand unprotected as far north as the St. Lawrence, and yield annually a large crop. North of that limit all that is necessary for its preservation is to throw over it, during winter, a quantity of dry leaves, to keep off intense frost, and, as spring opens, to clear away the litter and cultivate the ground. If there are three months of good sun, it is all the plant requires to mature it. Wherever oats will grow, the rhubarb will thrive; only give it depth of soil for its roots, and manure to stimulate its luxuriance. In southern latitudes it must be planted in moist situations, and under the shade of buildings, to ward off the scorching rays of the sun at mid-day, and in dry periods it must be watered freely. The whole of this continent, from the Gulf of Mexico to Hudson's Bay, may enjoy the luxury of this vegetable.

It may be forwarded by placing an inverted barrel or tub over it, before the ground freezes in autumn, covering with heavy litter, or by covering the plant itself from six to twelve inches with the same material.

Salsify, called by some oyster-plant, is good in soups, or to eat like the parsnip. It is cultivated like the parsnip, and like it, stands out the whole of an American winter.

Squash.—Varieties: early bush scollop, green striped bush, early crookneck, large cushaw, vegetable marrow, winter crookneck, Lima cocoa-nut, acorn, or California.

Cultivated precisely like the melon and cucumber, which see.

Spinach.—Every one knows how good and useful a plant this is. It is certainly preferable to any of the cabbage kind in point of wholesomeness, and it is of very easy cultivation. There is, in fact, but one sort that I know any thing of, though the seed is sometimes more prickly than at other times. To have spinach very early in the spring, sow on or about the first week in September, in drills a foot apart, and when the plants are well up, thin them to six inches. They will be fine and strong by the time that the winter sets in; and as soon as that time comes, cover them over well with straw, and keep the straw on till the breaking up of the frost. Sow more as soon as the frost is out of the ground, and this will be in perfection in June. You may sow again in May, but the plants will go off to seed before they attain to much size. If you save seed yourself, save it from some of the plants that have stood the winter.

Tomato.—Varieties: large red, large yellow, pear-shaped, cherry-shaped.

The seed should be sown early in March, in a slight hot-bed, and the plants set out in the open ground, if settled warm weather, in the early part of May. In private gardens it will be necessary to plant them near a fence, and to provide trellises for them to be trained to; they will, however, do very well if planted four feet distant from each other every way.

Tomatoes may be brought to perfection late in the summer by sowing the seed in the open ground the first week in May; these plants will be fit to transplant early in June, and the fruit may ripen in time for preserves, or for catsup.

Tomatoes may be preserved in a stone or glazed earthen pot, for use in the winter, by covering them with water in which a sufficient quantity of salt has been dissolved to make it strong enough to bear an egg. Select perfectly ripe berries, and cover the pot with a plate in such a manner that it presses upon the fruit without bruising it. Previous to cooking these tomatoes, they should be soaked in fresh water for several hours.

They are also preserved in their fresh and natural state in fruit-cans —an excellent, and now quite common practice.

Turnip.—See *Turnip* in *The Farm.*

Aromatic, Pot, and Sweet Herbs.—Varieties: garden Angelica, anise, sweet basil, borage, garden burnet, caraway, chervil, or the sweet-cicely; clary, coriander, dill, common fennel,* sweet fennel,* pot marigold, sweet-marjoram,* spearmint,* peppermint,* pennyroyal-mint,* common sage,* red sage,* summer savory, winter savory,* tarragon,* common thyme,* lemon thyme.*

Aromatic herbs are such as impart a strong spicy odor and savory taste; many of them are used as small pot herbs, and for sauces, stuffings, and other uses in cooking. As only a small quantity of these are necessary in private gardens, a by-corner may be allotted for them and such medicinal herbs as may be wanted in a family.

It may be necessary to explain, as we go along, that there are three principal descriptive names given to plants, namely, annuals, biennials, and perennials. The annuals being but of one season's duration, are raised every year from seed. The biennials are raised from seed one year, continue till the second, then perfect their seed, and soon after die; some of these should also be raised every year from seed. The perennials may be raised from seed, but when once raised, they will continue on the same roots many years. Those marked* are of the latter description, and may be propagated by suckers, off-sets, cuttings, or parting the roots. Those who have not already a plantation of these herbs may sow the seed of any of the different kinds in April or May, in drills about half an inch deep and twelve inches apart, each kind by itself. The plants may afterward be transplanted into separate beds; or if a drill for each kind be drawn two feet apart, the seed may be sown in them, and the plants afterward thinned out to proper distances, according to the natural growth of the different kinds of plants.

Plants Cultivated for Medicinal and Other Purposes.—Bene, boneset, or thoroughwort; balm,* castor-oil bean, burdock, catnep, celandine, chamomile,* comfrey,* elecampane,* feverfew, horehound,* horsemint,* hyssop,* lavender,* lovage, marsh-mallow,* motherwort,* patience-dock,* Carolina pinkroot,* opium poppy (annual), rosemary,* garden rue,* bastard saffron, skull-cap, or mad-dog plant; Virginian snake-root, sorrel,* southernwood,* Virginian speedwell,* spikenard,* tansy,* wormwood.*

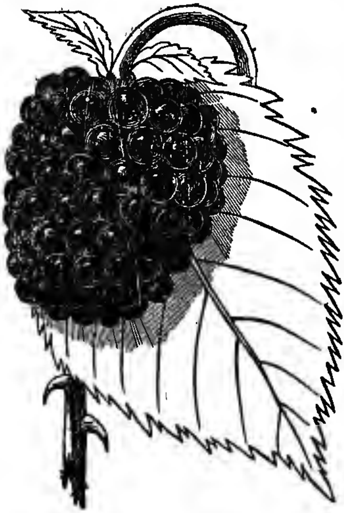
The generality of aromatic, sweet, and medicinal herbs may be raised from seed sown in April and May. The greater part of the above-mentioned plants are perennial, and will multiply from the seed they drop, or from partings from the roots. The off-sets, roots, or young plants thus raised, should be planted at suitable distances from each other early in the spring.

The beds should afterward be kept free from weeds, and as the herbs come into flower, they should be cut on a dry day, and spread in a shady place to dry for winter use. The best way to preserve them after they are dried is to rub them so as to pass them through a sieve, then pack them in bottles or boxes, each kind by itself; they should be afterward kept in a dry place.

In the month of October the herb-beds should be examined. Lavender, rosemary, and other tender plants should be taken up, potted, and placed in a frame or green-house for the winter. Thyme, hyssop, winter savory, southernwood, sage, rue, and the like, will require their tops to be neatly dressed; and pot marjoram, burnet, tarragon, tansy, pennyroyal, sorrel, chamomile, fennel, horehound, mint, lovage, and other kinds of hardy perennial herbs, should be cut down close to the ground.

After this is done, it will be proper to dig lightly, and loosen the ground between the roots of the shrubby plants; but the beds of close-growing running plants, such as mint, running thyme, and all other creeping herbs, will not well admit of digging; therefore, after the stalks are cut down, and the beds cleared of weeds, dig the alleys, and strew some of the loose earth evenly over the beds; and if the ground be rather poor or light, a top dressing of very rotten dung will be of considerable service.

THE FRUITS TO CULTIVATE.—The fruits appropriate to the garden are: The blackberry, currant, gooseberry, grape, dwarf pear, raspberry, strawberry and quince. All these may, and should be cultivated in every garden, though it contain no more than one eighth of an acre. The expense and labor are comparatively trifling, and the comfort, health and often profit, which their proper cultivation affords are by no means inconsiderable.


THE LAWTON

The Blackberry.—This is one of the easiest cultivated, the hardiest, most productive, the most acceptable, and we may also add, the most neglected of our berried fruits. The native plantations, once so plentiful in their supply, have largely yielded to the cultivation of farm crops, and we must now either dispense with the use of this excellent fruit, or resort to its artificial cultivation. As it can so easily be done, either by transferring to the garden, or to some inclosed portion of the building grounds the native sorts which do well, or some of the finer cultivated varieties, it will not, it is believed, be much longer neglected.

The following are good varieties: New Rochelle or Lawton—very large, intensely black, juicy, rather soft, sweet, excellent flavor; ripens the first of August, and continues in use six weeks; originated at New Rochelle, N. Y. Dorchester—nearly equal in size to the foregoing, but of a more elongated form; very sweet and high-flavored; vigorous and productive; ripens about the first of August; bears carriage well; originated in Massachusetts. Newman's thornless—promises to be valuable; not so well tested as the others. New York.

Cultivation.—The suckers of this year are planted out in rows, six feet apart, and the plants two feet apart in the rows. This is done in the fall, or early in the spring. At the time of planting they should be cut down to within a foot of the ground. They will bear a little, and they will send out several suckers which will bear the next year. About four is enough to leave, and those of the strongest. These should be cut off in the fall, or early in spring, to within four feet of the ground, and should be tied to a small stake. A straight branch of locust is best, and then the stake lasts a lifetime at least, let the life be as long as it may. The next year more suckers come up, which are treated in the same way.

Swamp muck, chip-dirt, leaf-mould, and a light dressing of salt are good applications. The best soil is a deep, rich, moist loam.

Currant.—The currant is propagated by cuttings, which should be planted in the fall in a shady situation. It requires moist, rich, deep loam, and should be trained as a bush. It bears on wood of previous year's growth; but mostly on two-years-old wood. As soon as the fruit is off, thin out the old wood, leaving only stems of the present and last year's growth. Clip off three or four inches of the former to make a growth of spurs for the next crop.

Varieties: cherry currant—the best variety, very large, nearly twice the size of the common red Dutch; round, light red, clusters moderately short, quite acid; growth large, tall, and luxuriant. Red Dutch—fruit of large size, oblate, borne in large clusters, and less acid than the common red; color fine transparent red. White Dutch—large yellowish white, less acid than the red kinds. Black Naples—is the largest and best of the black varieties; but none of these are desirable.

Gooseberry.—Varieties: crown bob, roaring lion, white Smith, red Warrington, Wellington's glory, Houghton's seedling. Crown bob—large, often an inch and a fourth long, roundish oval, red, hairy; flavor of first quality; branches spreading or drooping. Roaring-lion—very large, oblong oval, red smooth; flavor fine, hangs long, branches drooping. Houghton's seedling—fruit small, oval, commonly about three-fourths of an inch long; skin smooth, thin, glossy, a pale, dull reddish brown, marked with faint greenish lines; flesh tender, juicy, sweet, pleasant; ripens soon after midsummer. Not high-flavored, as compared with the best European sorts, but a profuse bearer, always free of mildew, and of very easy cultivation. A seedling from a wild American species; origin, Salem, Mass.

The gooseberry is propagated precisely like the currant. Manuring, high cultivation, and pruning, will, in some cases, prove sufficient to prevent mildew. This may be assisted by the cautious application of salt, either thinly over the soil, or directly upon the plant; in the latter case, the solution should be so thin that the saline taste may be just perceptible. But shading by a thick coat of salt hay appears to be the most efficient remedy. It should be spread in a layer of several inches, or even a foot in thickness, crowding it down to make room for the branches. This should be done in spring. It has proved quite successful in a multitude of instances, even as far south as Delaware. In inland districts, where sea-weed or salt hay cannot be had, a convenient substitute consists in placing coarse hay or straw beneath the bushes, and then applying a solution of salt with a watering-pot, avoiding direct contact with the bushes, if the solution be strong.*

HOUGHTON'S SEEDLING.

The Grape.—This delicious fruit is too much neglected. There are fine and hardy varieties as easily cultivated as the currant, and, when once established, will last an age—yielding annually an abundance of the most wholesome, palatable, and marketable fruit. The care required is very trifling, when compared with the rich returns they give.

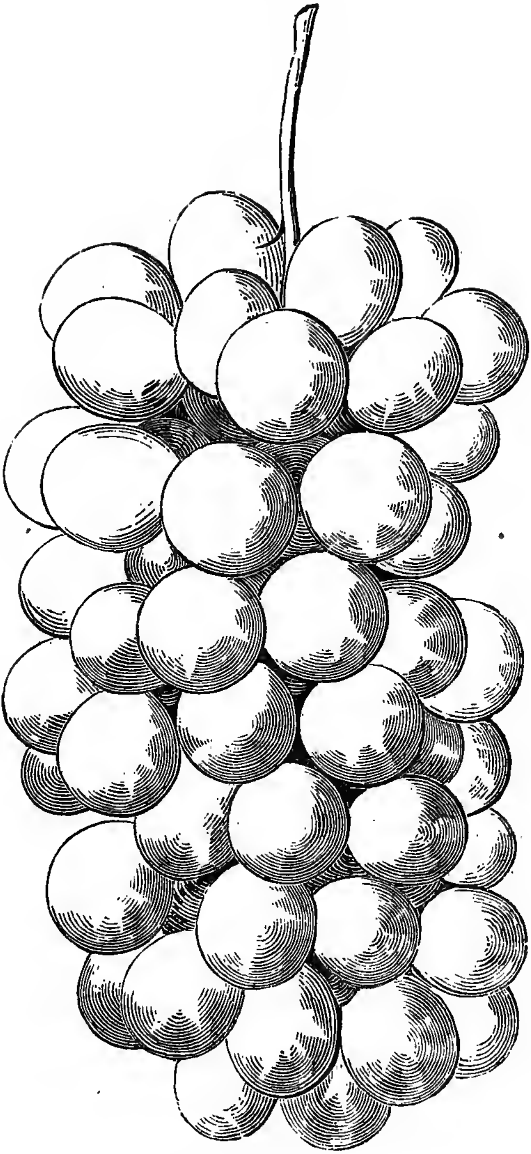
The varieties of both native and foreign grapes are very great. The following choice and hardy varieties may be grown as far north as 43°:

Catawba.—Bunches medium in size, shouldered; berries large, pale-red, deeper in the sun, with a thin lilac bloom; flesh slightly pulpy; juicy, sweet, aromatic, rich, slightly musky. Does not ripen well as far north as latitude 43°, except in warm exposures. Very productive.

Isabella.—Bunches rather large, shouldered; berries round-oval, rather large; skin thick, dark purple becoming nearly black, bloom blue; tender, with some pulp which lessens as it ripens; when fully ripe, juicy, sweet, rich, slightly musky. Ripens as far north as forty-three degrees latitude, except in unfavorable seasons. Very vigorous, and profusely productive. Origin, South Carolina.

Diana.—A seedling from the Catawba, which it resembles, but paler, or a pale grayish-red; bunches loose, berry round, almost without pulp; juicy, sweet, rich. It ripens earlier than the Isabella. Origin, Milton, Massachusetts.

* Thomas.



REBECCA GRAPE.*

* For many of the illustrations of this work, we are under obligation to the *American Agriculturist*, published by Orange Judd, New York, a monthly journal

Elsinburgh.—Bunches rather large, loose, shouldered; berries quite small, skin thin, black; bloom blue; pulp, none; melting sweet, excellent. Leaves, deeply five-lobed, dark green; wood slender, joints long. Hardy. New Jersey.

Propagation and Training.—The following on this subject, from Cobbett's "American Gardener," is one of the most concise and clear expositions of an easy and practicable mode of culture and training that we have seen. Graperies and arbors, by this mode, are rendered unnecessary; the vines may be planted along the north border of the garden, the south side of a building, or in any convenient place, in a single line; the vines and fruit are at all times within convenient reach for pruning or training the one, or thinning or plucking the other.

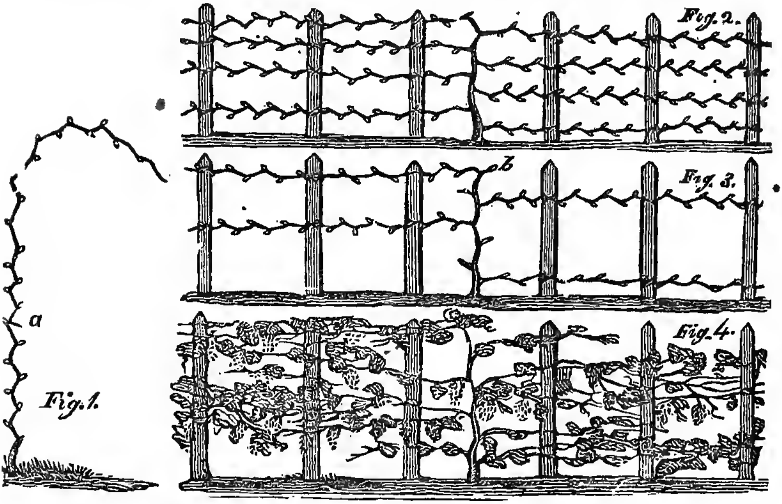
The grape-vine is raised from cuttings or from layers. As to the first—you cut off, as early as the ground is open in the spring, a piece of the last year's wood; that is to say, a piece of the wood which grew the last season. This cutting should have an inch or two of the old wood, but it is not absolutely necessary. The cutting should have four or five buds or joints. Make the ground rich, move it deep, and make it fine. Then put in the cutting with a setting-stick, leaving only two buds or joints above-ground. Layers from the grape-vine are obtained very easily. You have only to lay a shoot or limb, however young or old, upon the ground, and cover any part of it with earth; it will strike out roots the first summer, and will become a vine to be carried and planted in any other place. The cut represents the trellis-works for vines. These are to be five feet high, and are to consist of rows of posts put firmly into the ground.

Allow to each vine an extent of sixteen feet, and something more for overrunning branches.

Look now at the cut, which exhibits, in all its dimensions, the cutting become a plant, Fig. 1. The first year of its being a vine after the leaves are off, and before pruning, Fig. 2. The same year's vine, pruned in winter, Fig. 3. The vine in the next summer, with shoots, leaves and grapes, Fig. 4. Having measured your distances, put in a cutting at each place where there is to be a vine. You are to leave two joints or buds out of the ground. From these will come two shoots perhaps; and if two come, rub off the top one and leave the bottom one, and in winter cut off the bit of dead wood which will, in this case, stand above the bottom shoot. Choose, however, the upper one to remain, if the lower one be very weak. Or, a better way is, to put in two or three cuttings within an inch or two of each other, leaving only one bud to each out of the ground, and taking away in the fall the cuttings that send up the weakest shoots. The object is to get one good shoot coming out as near to the ground as possible. This shoot you tie to an upright stick, letting it grow its full length. When winter comes, cut this shoot down to the bud nearest to the ground. The next year another and a

devoted to agriculture and horticulture, a work, by the way, which we have found to be among the most accurate and reliable in the country, conducted by a gentleman of indomitable perseverance, who is wide-awake to the great interests he advocates, and whose journal should be in the hands of all who cultivate even a garden.

much stronger shoot will come out; and, when the leaves are off in the fall, this shoot will be eight or ten feet long, having been tied to a stake as it rose, and will present what is described in Fig. 1. You must



make your trellis, that is, put in your upright locust bars to tie the next summer's shoots to.

Four wires should run along the face of these posts, one the first one foot and a half from the ground; the others one foot apart. They may be fastened to the posts, which may be sixteen feet apart, by staples or large nails. These wires furnish admirable supports for the side-spurs, and are very quickly and cheaply applied. You will want eight shoots to come out to run horizontally, to be tied to these bars. You must now then, in winter, cut off your vines, leaving eight buds or joints, as at *a* fig. 1. During summer eight shoots will come, and, as they proceed on, they must be tied with matting, or something soft, to the bars. The whole vine, both ways included, is supposed to go sixteen feet; but if your tillage be good, it will go much further, and then the ends must be cut off in winter. Now, then, winter presents you your vine, as in fig. 2; you must prune, which is the all-important part of the business. Observe and bear in mind, that little or no fruit ever comes on a grape-vine, except on young shoots that come out of wood of the last year. All the four last years' shoots that you find would send out bearers, but if you suffer that, you will have a great parcel of small wood, and little or no fruit next year. Therefore, cut off four of the last year's shoots, as may be seen at *b*, fig. 3, leaving only one bud. The four other shoots will send out a shoot from every one of their buds, and if the vine be strong, there will be two bunches of grapes on each of these young shoots; and as the last year's shoots are supposed to be each eight feet long, and as there generally is a bud at or about every half foot, every last year's shoot will produce thirty-two bunches of grapes;

every vine one hundred and twenty-eight bunches and the eight vines, five hundred and twelve; and, possibly, nay, probably, so many pounds of grapes! Is this incredible? Take then, this well-known fact, that there is a grape-vine, a single vine, with only one stem, in the Queen of England's gardens at her palace of Hampton Court, which has, for perhaps half a centnry, produced on an average, annually, a ton of grapes; that is to say, 2,240 pounds avoirdupois weight. That vine covers a space of abont forty feet in length and twenty in breadth. And your two trellises being together one hundred and twenty-eight feet long and four deep, would form a space of more than half the dimensions of the vine of Hampton Court. However, suppose you have only a fifth part of what you might have, a hundred bunches of grapes are worth a great deal more than the annual trouble, which is, indeed, very little. Fig 4 shows a vine in summer. You see the four shoots bearing, and four other shoots coming on for the next year, from the butts left at the winter pruning, as at *b*. These four latter you are to tie to the bars as they advance on during the summer. When winter comes again, you are to cut off the four shoots that sent out the bearers during the summer, and leave the four that grew out of the butts. Cut the fonr old shoots that have borne, so as to leave but one bud at the butt. And they will then be sending out wood while the other four will be sending out fruit And thus you go on, year after year, for your life; for, as to the vine, it will, if well treated, outlive you and your children to the third and even thirtieth generation. I think they say that the vine at Hampton Court was planted in the reign of King William. During the summer there are two things to be observed, as to pruning. Each of the last year's shoots has thirty-two bnds, and, of course, it sends out thirty-two shoots with the grapes on them, for the grapes come out of the two first fair buds of these shoots. So that here would be an enormous quantity of wood, if it were all left to the end of summer. But this must not be. When the grapes get as big as peas, cut off the green shoots that bear them at two buds' distance from the fruit. This is necessary in order to clear the vine of confusion of branches, and also to keep the sap back for the supply of the fruit. These new shoots that have the bunches on, must be kept tied to the trellis, or else the wind would tear them off. The other thing is, to take care to keep nicely tied to the bars the shoots that are to send forth bearers the next year; and, if you observe any little side-shoots coming out of them, to crop these off as soon as they appear, leaving nothing but the clear, clean shoot. It may be remarked, that the butt, as at *b*, when it is cut off the next time, will be longer by a bud. That will be so, but by the third year the vine will be so strong, that you may safely cut the shoots back to within six inches of the main trunk, leaving the new shoots to come out of it where they will; taking care to let but one grow for the summer. If shoots start out of the main trunk irregularly, rub them off as soon as they appear, and never suffer your vine to have any more than its regular number of shoots. In cases where grapes are to be grown against houses, or to be trained over bowers, the principle is the same though the form may differ. If against the side of a house, the main stem of the vine might, by degrces, be made to go, I dare say, a hundred feet high. Suppose forty feet. In that case it would be forty instead of four; but the side shoots, or alternate bearing limbs, would still come out in the same manner. The stem, or side limbs may, with the greatest ease, be made to accommodate themselves to windows, or to any interruptions of smoothness on the surface. If the side of the house or place be not very high, not more than fifteen or twenty feet, the best way is to plant the vine in the middle of your space, and, instead of training an upright stem, take the two lowest shoots and lead them along, one from each side of the plant, to become stems, to lie along within six inches or a foot of the ground. These will, of course, send out shoots, which you will train upright against the building, and which you will cut out alternately, as directed in the other case.

As to cultivation of the ground, the ground should not only be deeply dug in the fall, but with a fork two or three times during the summer. They plow between them in Languedoc, as we do between the Indian corn. The ground should be manured every fall, with good, rich manure. Blood of any kind is excellent for vines. But, in a word, the tillage and manuring cannot be too good.

Lime, potash, and phosphates are the mineral constituents mostly required. Potash—wood-ashes—freely applied, is thought to improve the quality of the wine produced.

The American Pomological Society recommends but the three following varieties of grapes for general cultivation, viz.: the Isabella, Catawba, and Diana. The Rebecca has also been found valuable, and worthy of general cultivation.

Dwarf Pears.—See *Fruit Garden* in a following part of this work.

Raspberry.—Varieties: red Antwerp, orange, American red, American black, Fastolf, Franconia, Ohio everbearing.

Its cultivation is simple. Give the plants rich, deep, sandy, loamy soil, and they will send up an abundance of suckers every season, each of which will form a plant and produce fruit the year following.

In the autumn cut out all the old wood that produced fruit the past summer, close to the ground; tie up the new shoots to a stake or trellis, about five feet high; then cut off about a foot of the tops of the shoots, and the work is done.

To have a fine crop of late raspberries, cut down some of the canes or stems, in the spring, to within a few inches of the ground. The new shoots which will spring up will come into bearing in August or September.

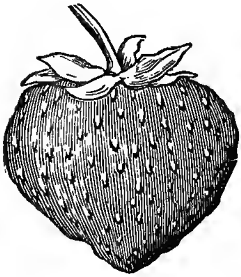
The Strawberry.—This early and delicious fruit receives less attention throughout the country than its importance demands; yet it is gratifying to find in this respect much improvement.

Varieties: large early scarlet, Black Prince, Burr's new pine, Western queen, Longworth's prolific, McAvoy's superior, Boston pine, Jenney's seedling, prolific hautboys, rival Hudson, Hovey's seedling.

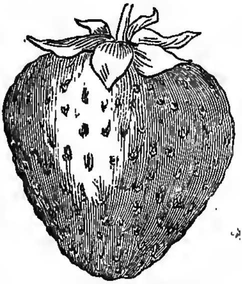
Wilson's Albany is one of the most prolific of strawberries, bearing a great abundance of fruit. The Genesee is a favorite market variety, prolific and excellent. The Boston pine and rival Hudson are every way fine varieties, and worthy of general cultivation.

Soil and Culture.—A rich, deep loam, inclining to clay, is the best soil, though sandy soils do well if made rich with a compost of animal manure—as bones, offal, etc., and decayed leaves, old mortar, and tanners' waste.

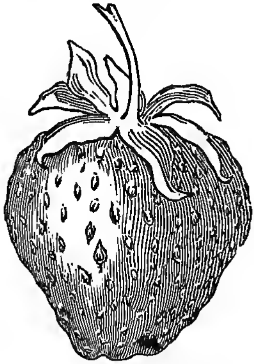
It often occurs that the staminates have become too numerous. These are easily detected, as they flower some four or five days earlier than the pistillates, and may then be drawn out.



BLACK PRINCE.

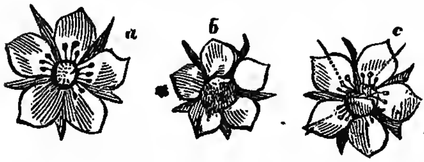


BURR'S NEW PINE.



HOVEY'S SEEDLING.

To distinguish Staminates from Pistillates.—In its natural state the strawberry produces perfect or hermaphrodite blossoms, but cultivation has wrought a change in this respect, and there are now three kinds represented and named as follows:



1st. Those in which the male or staminate organs are always perfect, like *a*, in the figure; but the female or pistillate organs are so defective, that they will very rarely bear a perfect fruit. These are called staminate. 2d. Those in which the female or pistillate organs are perfect (see *b*, in figure), but in which the male organs are generally so defective that they cannot produce fruit at all, unless in the neighborhood of, and fertilized by, staminate or hermaphrodite plants. Impregnated by these, they bear enormous crops. These are pistillate. 3d. (See figure *c*.) Those, like the native varieties, which are true hermaphrodites, that is, they are perfect in stamens, and more or less perfect in pistils, so that they generally produce a tolerable crop, and in favorable seasons, the pistils being fully developed, they will produce a good one. This is the staminate class of the books. The first of these classes, the staminate, rarely producing fruit, and running exuberantly to vine, should be dug up wherever they are found, since the hermaphrodite are productive, and equally useful for fertilizing. It is to the pistillate varieties, fertilized by the hermaphrodite, that we must look for large crops of fruit.*

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* White.

To Prolong the Fruiting Season.—The fruiting season may also be controlled at pleasure by means of cutting foliage and flowers, and liberal or restrained watering. If, for instance, a bed of Jenney's seedling be taken, of eight feet square, the first two feet square shall be permitted to bloom and fruit at its usual time; the next two feet shall have only its first fruit-stems plucked when just about to bloom; the third shall have its entire foliage and fruit-stems cut close to the ground, and when the second fruit-stems appear, they are also to be picked as in the second plat; the fourth shall be treated as the third, but receive no moisture after the first cutting for a space of ten days or two weeks. The result will be a succession of fruit in order.

The following very easy mode of raising the strawberry, by a spontaneous renewal of the plants, or "culture in alternate strips," is thus described by A. J. Downing, and has been successfully practiced in various parts of the country:

"Early in April, or in August, being provided with a good stock of strong young plants, select a suitable piece of good deep soil. Dig in a heavy coat of stable manure, pulverizing well and raking the top soil. Strike out the rows, three feet apart, with a line. The plants should now be planted along each line about a foot apart in the row. They will soon send out runners, and these runners should be allowed to take possession of every alternate strip of three feet—the other strip being kept bare by continually destroying all runners upon it, the whole patch being kept free of all weeds. The occupied strip or bed of runners will now give a heavy crop of strawberries, and the open strip of three feet will serve as an alley from which to gather the fruit. After the crop is over, dig and prepare this alley or strip for the occupancy of the new runners for the next season's crop. The runners from the old strip will now speedily cover the new space allotted to them, and will perhaps require a partial thinning out to have them evenly distributed. As soon as this is the case, say about the middle of August, dig under the whole of the old plants with a light coat of manure. The surface may be then sown with turnips or spinach, which will come off before the next season of fruits.

"In this way the strips or beds occupied by the plants, are reversed every season, and the same plot of ground may thus be continued in a productive state for many years."

The Quince.—Varieties: apple-shaped or orange; pear-shaped—later than the former, and does not bear so well; Angers—said to be the best variety, though the orange is often preferred.

Propagation, soil and culture.—It is propagated from seeds, slips, layers or cuttings. The soil should be rich and deep, and kept free from grass and weeds. Liquid manure is a good application, as is also weak brine. They are greatly benefited by judicious pruning.

The bearing branches, or spurs of the quince, are small twiggy shoots, produced on wood at least two years old. These bear two, three, or more fruit-buds. These produce shoots two or three inches long, on the point of which the fruit is borne singly. These spurs have always wood-buds, as well as fruit-buds, and therefore should be shortened back the spring after they have borne, in order to produce new spurs at the same point.

PROFITS OF GARDENING.—Dr. Bigham, the late physician of the Utica Insane Asylum, gives the following, as the produce in a single season of one and one fourth acre of land connected with that institution. The land was good and annually manured. The produce was as follows: 1100 heads lettuce, large; 1400 heads cabbage, large; 700 bunches radishes; 250 bunches asparagus; 300 bunches rhubarb; 14 bushels pods marrowfat pease; 40 bushels beans; sweet corn, 3 plantings, 419 dozen; summer squash, 715 dozen; squash peppers, 45 dozen; cucumbers, 756 dozen; cucumber pickles, 7 barrels; beets, 147 bushels; carrots, 29 bushels; parsnips, 26 bushels; onions, 120 bushels; turnips, 80 bushels; early potatoes, 35 bushels; tomatoes, 40 bushels; winter squash, 7 wagon loads; celery, 500 heads—all worth 621 dollars in Utica market, but supplied one hundred and thirty persons with all they could consume. Only one man was required to do all the necessary labor.

GARDEN IRRIGATION.—The extraordinary increase of produce which may be obtained by the practice about to be explained here, ought to excite many who have favorable opportunities for so doing, to prepare a plot of ground on the same plan.

The admirable economy of the Chinese in their management of manure, and the nearly equal thriftiness of the Belgians in the same respect, are much surpassed by the method which may be seen at Caversham, in a small garden within a few yards of the lower Reading railway station.

Mr. Wilkins's Model Garden at Caversham, Berks, England.—The system has been pursued there by Mr. Wilkins during some years with perfect success. The practice of giving manure to the roots of plants by pipes under the surface, had been in some instances practiced by ingenious gardeners, in the growing of celery more particularly, but the carrying out of the principle in the general and complete manner shown at Caversham, is considered by Mr. Wilkins to have been his own discovery; and he has obtained a patent for it.

Mr. Wilkins prepares the manure in a covered tank, similar to a tanner's bark liquid-pit, of a size proportioned to the quantity required for the garden. This tank has a false bottom, placed at from one to two feet from the bottom of the tank, and pierced with numerous small holes.

Into this tank are thrown solid manures, such as dung from stables and cow-houses, pigstys, street-sweepings, and various animal and vegetable refuse substances. It is then filled with water, which, in passing through the manuring matter, becomes impregnated with its elements; it trickles through the perforated bottom, and thus strained, is pumped up into a tank on a higher level, to give it a fall into a pipe which conveys it to the beds in which the crops to be irrigated by it are growing.

The ground is laid out in beds three feet in width, and divided into equal lengths by a walk, on one side of which the beds are watered on Mr. Wilkins's principle, while on the other they are not.

Thus crops under both modes of treatment may be compared.

Description of the Mechanical Arrangements.—The beds, under this new system, are prepared thus: the earth is dug out to the depth of about two feet, and the perfectly level bottom is covered with bricks or tiles (or it may be more cheaply done with concrete) quite water tight, with bricks on edge at the four sides, to prevent the liquid from escaping. Upon the bottom is laid, the whole lengthway of the bed and midway, a line of half-round drain-tiles, laid together (the convex part uppermost) in the usual way. At the end of each bed next the walk, a pipe is slantingly fixed, inclining downward to the main channel, for the purpose of conveying the liquid into it, and an upright pipe is placed at the other end as an index, by which any one looking into it, or gauging the depth, can tell the height to which the moisture rises.

The surface being prepared as described, the earth that had been removed is thrown back again.

By means of a gutta-percha hose, with arms that can be turned to each bed, furnished with stop-cocks, the liquid can be supplied to all or any of the beds at once. It passes along their entire length at bottom, rising through the interstices between the pipes; and being absorbed by the earth, it feeds the roots of the plants. None of it runs to waste: it cannot escape through the bricks.

That this system of applying manure is productive of great results, no one who has seen Mr. Wilkins's crops can doubt. The plants are directly supplied with food in the form in which it is most suitable to them; none of it is lost by evaporation, which in surface irrigation must take place. Neither scorching heat of the sun, nor parching wind, deprives it of its most precious qualities. The plants imbibe the full amount of nourishment which the manure contains: there is no waste whatever.

On the beds thus prepared and thus manured, the differences in some of the crops were in the following proportions:

On the new beds, mangolds weighed about three times more than those grown on the opposite beds treated in the old way.

Swedes measured twenty-three and a half inches in girth in the one instance, and less than half this in the other.

The yield of wheat, peas, and beans was double the amount on the watered beds.

A single potato grown in mere sand produced ninety-four tubers, while two planted under the old system produced but seventy-seven. A single ash-leaved kidney planted in saw-dust yielded, under the new system, one hundred tubers, weighing twenty-four pounds.

Similar differences were seen in the crops of hemp, flax, hops, Lucerne and Italian rye-grasses: five cuttings were obtained of the two last by the underground watering; while only two were obtained from the unwatered beds.

A very remarkable distinction appeared in the growth of two vine-cuttings, both planted at the same time, one receiving the liquid manure, and the other being without it—the former was about fifteen inches high when the other was scarcely four.

Gardens belonging to poor-houses and various public establishments of an industrial nature, might, to some extent at least, be treated on this plan. On very poor and otherwise almost worthless soils, the system would be especially valuable. The soil would be only important to give fixity to the roots; therefore its quality would not be a very important consideration wherever the liquid tank and a brick or cement flooring of the garden were provided.

A tub would answer the purpose of a tank on a small scale, and the liquid could be poured by hand from any convenient utensils down the throat of an inclined pipe into the horizontal pipe below, whenever moisture might be required by the roots below. There is no expense of any moment involved in a simple contrivance of this nature for poorhouse and parochial-school gardens; such an arrangement as Mr. Wilkins has effected would be highly economical and effective.

The formation of a well-contrived cesspool in a convenient position would be more than half the work to be accomplished.

THE FRUIT-GARDEN.—THE FRUITS TO CULTIVATE.

In "The Kitchen-Garden" we have described the fruits appropriate to it, and their modes of culture. We will here confine our attention to the Fruit-Garden proper, and its appropriate fruits, which are

Apples, Pears, Peaches, Plums, Cherries, Apricots, Nectarines.

Before proceeding to describe the varieties and mode of culture of the particular fruits, we will speak concisely of the different methods of propagation, planting, and pruning.

HOW TO PROPAGATE FRUIT-TREES.—This is effected by *Seeds*, *Cuttings*, *Layers*, *Grafting*, and *Budding*.

Cuttings consist of a portion of the wood of one year's growth inserted into the soil. They should be from eight to ten inches long, and all the lower buds removed. The earth should be closely pressed about them, and mulched, and the cutting shielded from the direct rays of the sun. The gooseberry, currant, grape and quince are easily propagated by cuttings.

Layers.—A few directions will show how layering is accomplished. An incision must be made on the under side of the branch; if done carefully, it will facilitate the striking of roots. The centre should be buried about four inches in the soil. It may be done in spring, or about midsummer, and the roots transplanted the following spring. After the buds of the grape-vine have started a few inches it may be laid along the surface and covered with soil, when each bud will take root.

Grafting.—The following are the different forms described by J. J. Thomas in the "American Fruit Culturist."

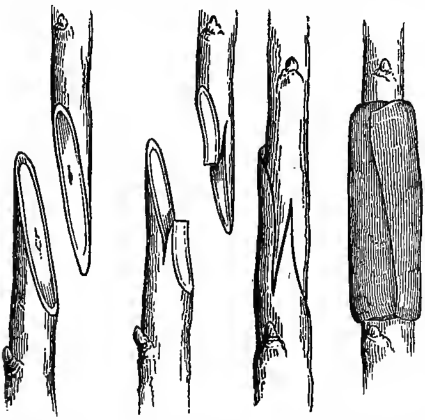


Fig. 15. Fig. 16. Fig. 17. Fig. 18.

The annexed figures represent the two most common modes of grafting fruit-trees; figs. 15 to 18 representing successive stages of tongue or whip grafting, from the sloping cut of the scion and stock, to the completion of the operation by the covering with the wax plaster. Fig. 19 shows a stock cut off for cleft-grafting with the upright cleft separated by an iron or steel wedge, ready for the graft; fig. 20, cut wedge-form to fit it; and fig. 21, the graft in its place, after the wedge has been withdrawn, the projecting angle of the stock sloped off with a knife, and the whole ready for the application of the wax.



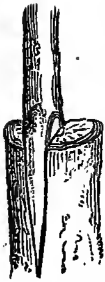


Fig. 20. Fig. 19. Fig. 21.

Whip grafting is particularly applicable to small stocks, or where the graft and stock are nearly of equal size; and cleft-grafting to stocks considerably larger than the scion. In all cases, where the stock is in any degree larger, the graft must be placed toward one side, so that the line between the bark and wood may exactly coincide at one point at least in both, as in the cross section of cleft-grafting.

There are other modifications of grafting which are often useful. In saddle grafting, the stock is sloped off on each side, giving it the form of a wedge, fig. 23, *a*; the graft is split in the middle, and each side thinned away with the knife, as in fig. 23 *b*, until it will closely fit when placed like a saddle upon it, fig. 24. The most perfect way to fit the graft, is to make a long sloping cut from the outer edge or bark, by drawing the blade from heel to point, till it reaches the center of the graft; and then another similar cut completes the acute cavity for fitting the wedge of the stock. A sharp, broad, and thin blade, is needed for this operation. A wax plaster, drawn closely round the place of union, completes the work. When the stock and graft are very nearly of equal size, this is a very perfect mode of grafting, as large corresponding surfaces are made to fit, and the graft receives freely the ascending sap.

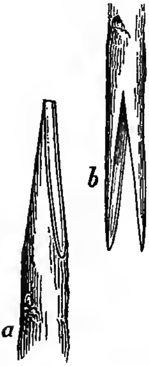


Fig. 23.

Fig. 24.

In all these modes of grafting, whenever a wedge is made to enter a cleft, it should be thicker on the side where the fit is made between the two parts, so as to receive at that side the full pressure of the cut faced.

Grafts may be cut at any time after the cessation of growth late in the summer, and before the spring growth commences. But they must be kept in a damp place. Wet moss is the best material in which to preserve them.

Grafting-Wax, made as follows, should neatly cover all the splits and cuts made in grafting: four parts rosin, three parts beeswax, and three parts lard. In these, after being melted and thoroughly mixed, strips of cotton cloth should be dipped, and cut when cold to any desired length and width.

Budding.—Common shield budding consists in leaving a small piece of wood at the base of the bud inserted, instead of taking all out. An incision is made lengthwise through the bark of the stock, and a small cut at right angles at the top, the whole somewhat resembling the let-

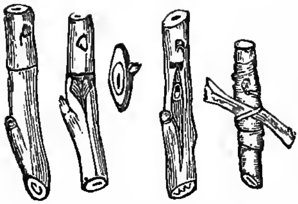
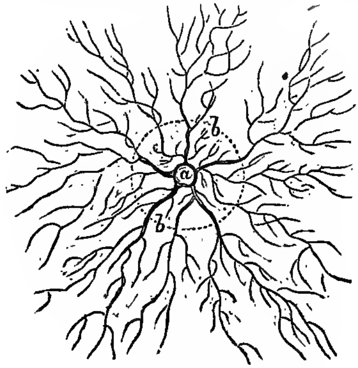


Fig. 3. Fig. 5. Fig. 4. Fig. 6. Fig. 7.

ter T, fig. 3. A bud is then taken from a shoot of the present year's growth, by shaving off the bark an inch or an inch and a half in length, with a small part of the wood directly beneath the bud, fig. 4. The edges of the bark, at the incision in the stock, are then raised a little, fig. 5, and the bud pushed downward under the bark, fig. 6. A bandage of bass-bark, woolen yarn, or other substance, is then wrapped around, commencing at the bottom and passing the bud, returning again and tying just below, covering all but the bud, fig. 7. The pressure should be just sufficient to keep the inserted portion closely to the stock, but not such as to bruise or crush the bark. In about ten days or two weeks after insertion, the strings will require to be loosened, and at the expiration of three weeks removed altogether. The ensuing spring, as soon as the buds begin to swell strongly, cut off the stock about six inches above the bud; and as the shoot or bud grows, tie it to the piece of stock above its insertion until about midsummer, when it will be time to cut away the piece of stock above the bud, leaving a sloping cut downward from the top of insertion of bud.*

The leaf should be cut off to within half an inch of the bud, as otherwise the evaporation would destroy its vitality. From July to the middle of September is the season for budding, choosing always cloudy weather, and the time when the bark freely cleaves from the wood.



ROOTS OF A TREE ENTIRE.

Transplanting.—Trees should be taken up with the roots as perfect as possible, bearing in mind that the roots of a tree extend every way as far as the branches; and in proportion as the roots have been shortened in taking up, in the same proportion should the branches be shortened in setting out. The soil in which the trees are to stand should be deeply subsoiled, two feet at least, or pits six feet across should be opened to that depth, the surface soil returned to the bottom, and the subsoil

* Elliott's "Fruit Grower's Guide."

mixed with very rotten manure next thrown in, and the tree itself planted in fine loam. It should stand at the same depth as in the nursery.

The annexed cut will show the appearance of a tree with its roots entire, and the nearer an approach is made to it in the taking up and setting, the better the operation is performed.

Time to Transplant.—As a general rule the autumn is the best time, though if done in spring, care should be taken to mulch thoroughly the transplanted trees.

Pruning.—Mr. Barry judiciously remarks: "It is not only necessary to know what and why, but also how to prune. Theory is only useful as it serves to guide in practice.

"The great point to be observed in making incisions on the stems and branches of trees, is to provide for the speedy and perfect healing of the wounds or cut surfaces. In removing a portion of a branch or stem, if we cut between two joints, and thus leave a portion of wood above the bud intended to be cut to, as in fig. 1, this wood dies, and we have the trouble of another pruning to remove it. If we cut too close to the bud, and thus remove a portion of the wood with which it is connected, as in fig. 2, the bud will either die or disappoint us by producing a very feeble growth. The proper way is to take the branch to be operated on in the left hand, place the edge of the knife on it, opposite the lower part of the bud to be cut to, and then make a firm, quick, smooth draw-cut, sloping upward, so that the knife will come out on a level with the point of the bud, as in fig. 3. In soft-wooded, pithy trees, like the grape-vine, for example, half an inch of wood ought to be left above the bud. The cut should also be made, as much as possible, on the lower side of the branch, to prevent rain from lodging in the center. The position of the bud cut to, is also worthy of consideration in pruning, to produce or modify certain forms. When we wish the new shoot of a lateral branch to take as much as possible an upright direction, we prune to a bud on the inside; and if we wish it to spread, we choose one on the outside. In the annual suppression, or cutting back young trees, to form a stem or side-branches, the bud selected to form the leader is chosen on opposite sides every successive year, in order to maintain the growth in a straight line. If cut every year to a bud on the same side, it would, in a few seasons, show an inclination to that side injurious to the symmetry of the tree."

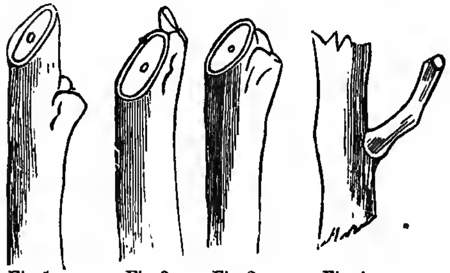


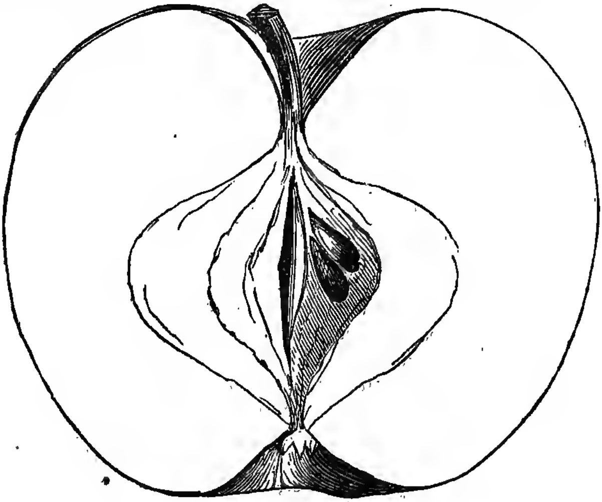
Fig. 1. Fig. 2. Fig. 3. Fig. 4.

Fig. 1, cutting too far above the bud. Fig. 2, cutting too close. Fig. 3, the cut as it should be. Fig. 4, removal of branches, the cross line indicating the proper place for the cut.

The season for pruning is generally at the end of the first growth in July or August, or late in autumn or winter, but not in the spring. Spring pruning is discountenanced by all the best authorities on fruit-culture. Large branches when cut should receive a coat of shellac dissolved in alcohol, of the consistence of paint, and applied with a brush. It adheres firmly, keeps out the air, aids the perfect healing of the wound, and can be easily and rapidly applied.

THE DIFFERENT FRUITS TO CULTIVATE.—SELECT VARIETIES AND MODE OF CULTURE.

We shall not attempt here to name, much less to describe the *nine hundred varieties* of the apple, to be found in our later and larger fruit-books. Such a formidable array of names would tend to embarrass and confuse, rather than instruct and satisfy the great majority of fruit cultivators. What they most need is a classification and description of the best-known varieties of the different fruits, adapted to the different seasons and localities, and in sufficient number and variety to meet the wants of cultivators generally. This has been our aim. The list we give contains those fruits only which have been thoroughly tested, and which are worthy of general cultivation. We adopt, by permission, the description of fruits from the "American Fruit Culturist," by J. J. Thomas, a work of superior excellence, and on which the fullest reliance can be placed. It is the production of one who unites with the largest practical experience and love of the pursuit, an exact and liberal culture, and that fidelity and care in his statements which give them paramount value.



THE APPLE.—SELECT VARIETIES.

SUMMER APPLES.—Bough.—(*Syn.* large yellow bough, sweet bough, early sweet bough.) Large, roundish, remotely conical-ovate, sometimes distinctly conical; pale, greenish yellow, stock one-half to an inch long, basin narrow, deep; flesh white, very tender, with an excellent sweet flavor. Ripens from the middle to the end of summer. A moderate and regular bearer. Shoots yellowish, somewhat irregular, ascending; tree round-headed; leaves obtusely crenate.

Summer Rose.—(*Syn.* Woolman's early, Woolman's striped harvest.) Medium, or rather small, roundish oblate; yellowish, blotched, and streaked with red; stalk rather short; basin round, slightly plaited; flesh very tender, slightly crisp; texture fine, mild subacid, juicy, excellent. Begins to ripen with wheat harvest, and continues a month. Fine in all localities. Better in quality for the table than early harvest, but less productive.

Golden Sweet.—Medium, or rather large, roundish, slightly flattened; greenish, becoming pale yellow; stalk an inch or more long, slender; cavity acuminate; basin moderate; flesh very sweet, good, hardly first-rate. The fruit is always fair, the tree a free grower, and very productive. Buds large; leaves sharply serrate. Late in summer. Valuable for domestic animals.

American Summer Pearmain.—(*Syn.* early summer pearmain of *Coxe.*) Medium in size, oblong, slightly inclining to truncate-conical; nearly covered with fine broken streaks and dots of red; stalk nearly one inch long; basin round, even, distinct; very tender, often bursts in falling, subacid, flavor fine. Continues to ripen for several weeks in late summer and early autumn. Needs good and rich cultivation. Growth rather slow. This is distinct from the English summer or autumn pearmain, in its larger size, higher red, more oblong form, and superior quality.

Early Harvest.—(*Syn.* yellow harvest, prince's harvest, early French reinette, July pippin.) Size, medium, roundish, usually more or less oblate, smooth; bright straw-color, when ripe; stalk rather short and slender; calyx moderately sunk; flesh nearly white, flavor rather acid, fine. Ripens at wheat harvest and for three weeks afterward. Shoots erect, slightly diverging, straight, often forked. Very productive. Needs rich cultivation to be fine. Good throughout the Northern states.

The Tart-Bough is similar, but two weeks later, and inferior in quality; the growth more vigorous and upright.

Early Joe.—Size, medium, or rather small; oblate, sometimes obscurely approaching conical; smooth and regular; color, with numerous short, broken red stripes on yellow ground, a nearly uniform deep red to the sun, with conspicuous white specks; stem three-quarters of an inch long, rather thick; cavity shallow, acute; basin small, even; flesh fine-grained, very tender, slightly crisp, juicy, subacid, spicy, excellent. Ripens the last two weeks of summer. Shoots dark, growth slow. A profuse bearer. Origin, East Bloomfield, New York.

Early Strawberry.—(*Syn.* American red Juneating, of *Manning.*) Rather small, roundish, varying to round-ovate, and sometimes quite conical; surface indistinctly and finely striped with bright and deep red, tinging faintly the flesh; stalk tender, three-quarters to an inch and a half long; basin small and narrow; flesh white, tender, subacid, rather brisk, pleasant, not very rich. Ripens one to three weeks later than yellow harvest. Growth, very erect; leaves erect, finely crenate. Productive. Good in all localities.

Garden Royal.—Below medium, roundish, slightly flattened at ends, even and regular; surface with small, broken red stripes on yellow ground, deep red to the sun; stalk short, or half to three-fourths of an inch long, slender, cavity acute; calyx large, open; basin very shallow; flesh yellowish-white, exceedingly tender and fine-grained; flavor mild, subacid, fine. A poor grower, but a first-rate dessert fruit. Late summer. Origin, Sudbury, Massachusetts.

Porter.—Rather large, oblong ovate-conical, regular, often ribbed at the apex; bright yellow, sometimes a dull blush in the sun; stalk one inch long, slender, cavity rather small; basin narrow; flesh tender, rich subacid, of fine flavor. Fair and productive. Early autumn. Good throughout the Northern states. Leaves sharp serrate.

Red Astrachan.—Rather large, sometimes quite large, roundish-oblate, slightly approaching conical, rather smooth; nearly whole surface brilliant deep crimson, with a thick bloom like a plum; stalk one-half to three-fourths of an inch long; calyx in a small, slightly uneven basin; flesh white, rather crisp; good, rather acid, very slightly austere. A few days after early harvest. Excellent for cooking. Shoots stout, dark brown, diverging and ascending; leaves broad. This apple, although of second-rate flavor, is rendered by its earliness and very handsome and fair appearance, by the vigor and productiveness of the tree, and its excellent culinary qualities, worthy of general cultivation.

Sine Qua Non.—Size, medium; roundish, inclining to conical; smooth, pale greenish-yellow, shaded with reddish-brown to the sun; stalk quite slender, nearly an inch long; basin smooth, or very slightly plaited; flesh greenish-white, fine-grained, delicate, very tender, moderately juicy, of a fine, agreeable, subacid flavor. Shoots greenish-yellow, growth slow; fruit always fair, tree very productive. Ripens two weeks after early harvest. Origin, Long Island.

Summer Bell-flower.—Rather above medium, round-ovate, slightly oblong and conical; yellow, with sometimes a faint orange blush; stalk an inch long, cavity shallow; basin small, smooth, slightly five-sided; flesh white, fine grained, tender, rich, subacid, fine. Shoots vigorous, upright; bears well every year. Origin, Dutchess County, New York. New.

Williams' Favorite.—(*Syn.* Williams, Williams' red, Williams' favorite red.) Size, medium, sometimes rather large; oblong-ovate, remotely conical, very smooth; color, mostly fine dark crimson stripes; stalk three-quarters to one inch long, enlarged at insertion, cavity shallow; basin small and shallow, even or somewhat ribbed; flesh yellowish white, moderately juicy, with sometimes a tinge of red near the surface, mild, agreeable, fine. Ripens for several weeks late in summer. Its handsome appearance has partly contributed to its high reputation. Origin, Roxbury, Massachusetts.

AUTUMN APPLES.—Jersey Sweeting.—Size, medium; round-ovate, often oblong-ovate, somewhat conical; thickly striped with fine red on greenish yellow; stalk one-half to an inch long; cavity rather irregular; basin wrinkled, distinct; flesh whitish, very sweet, juicy and tender, good second-rate or nearly first-rate in flavor. Good in all localities. Early and mid-autumn—immediately follows golden sweet. Shoots stout, short-jointed; leaves crenate-serrate.

Peach-Pond Sweet.—Size, medium; roundish-oblate, remotely conical; delicately striped light red on pale greenish-yellow; stalk slender, varying in length from half an inch to an inch; tender, rich, sweet. Nearly or quite first-rate. Mid-autumn. Origin, Dutchess County, New York.

Autumnal Swaar.—(*Syn.* sweet Swaar.) Large, oblate, sometimes very slightly ribbed; rich yellow; stalk an inch or more long, varying from long and slender, to thick and fleshy at insertion; cavity and basin wide and slightly ribbed; flesh tender, yellowish, not juicy, with a very sweet, spicy, agreeable flavor. Mid-autumn. Growth vigorous, shoots diverging, tree spreading. One of the finest autumn sweet apples.

Gravenstein.—Rather large, roundish, slightly oblate, obtusely and obscurely ribbed, surface a little wavy; striped and splashed with bright red on a yellow ground; stalk three-quarters of an inch long, cavity rather deep; calyx large; basin deep, narrow; flesh tender, juicy, very rich, subacid or rather acid, high-flavored. Mid-autumn. Productive, handsome and excellent. Fine in all localities. Shoots strong, becoming smooth and shining, ascending. German.

Haskell Sweet.—Large, oblate, regular, greenish, a warm brown cheek; stalk one-half to three-fourths of an inch long, moderately sunk; basin rather deep, nearly even, flesh tinged with yellowish brown, very tender, sweet, good. R. Manning says this is the best of autumn sweet apples.

Summer Sweet Paradise.—Large, roundish, sometimes remotely oblong, and slightly flattened at the ends, regular, pale green; stalk rather thick, three-quarters of an inch long; basin large, distinct; flesh tender, sweet, rich, aromatic, of first-rate flavor. Ripens first of autumn. Shoots spreading, leaves sharply serrate. Origin, Pennsylvania.

Late Strawberry.—(*Syn.* strawberry, autumn strawberry.) Size, medium; roundish, slightly conical, sometimes faintly ribbed; nearly whole surface with small broken streaks of light and dark red; stalk slender, about an inch long; basin ribbed; flesh yellowish white, slightly fibrous, very tender and juicy, with a fine, very agreeable, subacid flavor. Young trees of remarkable thrifty growth, leaves sharply serrate, which at once distinguishes them from the crenate leaves of the early strawberry. Ripens early in autumn, and often keeps till winter. Very productive. One of the best early autumn apples.

Dyer.—(*Syn.* pomme royal, which is the original name.) Rather large, roundish, often approaching round oblong, sometimes slightly flattened, obscurely ribbed; light yellow, rarely a faint brown cheek, and sometimes a slight russet network over the skin; stalk three-fourths to one inch long; basin often deep and large, ribbed; flesh very fine-grained, tender, very juicy, with a rich subacid or rather acid, excellent flavor, having but few equals.

Fall Pippin.—(*Syn.* Holland pippin, erroneously.) Very large, roundish, obtuse, somewhat oblong-conical, a little flattened at the ends, sometimes with large obtuse ribs; color greenish, becoming a high rich yellow when ripe, with some large shades of green about the crown before fully ripe; stalk large, in an acuminate cavity; basin deep; flesh yellowish, rather firm, becoming tender, rich, aromatic, excellent.

Leaves sharply serrate; shoots vigorous, rather dark, diverging, becoming spreading; tree large. Late autumn, keeping into mid-winter.

Hawley.—(*Syn.* Dowse.) Quite large, roundish, slightly conical, sometimes nearly round, with a broad obtuse apex, and slightly flattened; smooth, slightly oily when kept within doors; pale green becoming yellow, sometimes a very faint orange cheek; stalk one-half to one inch long, slender; cavity wide, deep, acute, sometimes slightly obtuse; basin deep, slightly furrowed; flesh yellowish white, fine-grained, quite tender, with a mild, rich, subacid, fine flavor. Ripens at mid-autumn. A very valuable apple. Shoots of rather slow growth. Origin, Columbia County, New York, and cultivated chiefly in western New York.

Orne's Early.—Rather large, somewhat ribbed, pale yellow, sprinkled with thin russet, and with a dull red cheek toward the sun. Flesh white, very tender, juicy, and with an exceedingly pleasant and fine flavor. Ripens the first of autumn.

Late Strawberry.—(*Syn.* strawberry, autumn strawberry.) Size, medium; roundish, slightly conical, sometimes faintly ribbed; nearly whole surface with small broken streaks of light and dark red; stalk slender, about an inch long; basin ribbed; flesh yellowish-white, slightly fibrous, very tender and juicy, with a fine, very agreeable, subacid flavor. Young trees of remarkable thrifty growth, leaves sharply serrate, which at once distinguishes them from the crenate leaves of the early strawberry. Ripens early in autumn, and often keeps till winter. Very productive. One of the best early autumn apples.

WINTER APPLES.—Baldwin.—Rather large, roundish, with more or less of a rounded taper toward the apex; shaded and striped with yellowish red and crimson on yellow ground; stalk three-quarters of an inch long, rather slender; calyx in a narrow, slightly plaited basin; flesh yellowish white, with a rich, mild, subacid flavor. Young tree vigorous, upright, shoots dark brown, diverging and ascending. Very productive. Ripens through winter. A first-rate winter apple through New England and New York; unsuccessful in northern Ohio. The use of special manures, as lime, potash, and salt, has, however, on those unfavorable localities, been attended with the best results, and produced fine fruit; showing the deficiency to be in the soil.

Newtown Pippin.—(*Syn.* pippin, green Newtown pippin.) Medium or rather large, roundish, oblique, slightly irregular, remotely conical, or else a little flattened; dull green becoming yellowish green; often with a dull brownish blush; stalk short, deep set, and surrounded by thin, dull, whitish russet rays; basin narrow, shallow; flesh greenish white, juicy, crisp, fine-grained, with a high, fine flavor. Keeps through spring, and retains remarkably its freshness. Tree of rather slow growth, with a rough bark. The fruit is very liable to black spots or scabs, unless under high, rich, and constant cultivation, with a good supply of lime in the soil. One of the best fruits for foreign markets. A native of Newtown, Long Island, and has rarely succeeded well in New England.

Roxbury Russet.—(*Syn.* Boston russet, Putnam russet of Ohio.)—Medium or large, roundish-oblate, remotely conical, partly or wholly covered with rather rough russet on greenish yellow ground, sometimes a dull brown cheek; stalk one-half to an inch long, cavity acute; basin round, moderate; flesh greenish-white, rather granular, slightly crisp, with a good subacid flavor. Keeps late in spring. Large specimens become conical, with short thick stalks; small specimens are more flat, and with longer and more slender stalks. Growth spreading, shoots downy. Although not of the highest flavor, its productiveness, uniformly fair fruit, and long keeping, render this variety one of the most profitable for orchard culture. It succeeds well throughout the Northern states, but partially fails in a few localities in Ohio.

Hubbardston Nonesuch.—Large, round-ovate, largest at the middle, nearly regular; color with small broken stripes and numerous dots of light rich red on a rich yellow ground; stalk three-fourths to one inch long; cavity acute, russeted; calyx open, basin ribbed; flesh yellowish, very rich, slightly subacid, with a strong mixture of a rich sweet; flavor excellent. Early winter. Equal to the Swaar in richness, superior to the Baldwin in flavor. Shoots rather slender, gray. A native of Hubbardston, Massachusetts.

Wagener.—Medium or rather large, oblate, obscurely ribbed, shaded, and indistinctly striped with pale red, and a full, deep red in the sun, on warm yellow ground; often streaked with russet; stalk three-fourths of an inch long, cavity wide, rather obtuse; basin even, rather large; flesh yellowish, very fine-grained, tender, compact, mild, subacid, very aromatic, excellent. Ripens through winter. A native of Penn Yan, New York. New.

Rhode-Island Greening.—(*Syn.* greening.)—Large, roundish-oblate; green, becoming greenish yellow, always fair, a dull brown blush to the sun; stalk three-fourths of an inch long; basin rather small, often slightly russeted; flesh yellow—a rich yellow if much exposed to the sun, and whitish-yellow or greenish-white if much shaded—tender, juicy, with a rich, rather acid flavor. Growth strong, young trees crooked or oblique, shoots rather spreading, leaves sharp serrate; best on light soils; very productive, single trees often yielding forty bushels of fair fruit in favorable years, and neglected orchards five hundred bushels per acre. Fine throughout the Northern states, where it keeps through winter into spring; but fails, from a deficiency in the soil, through most parts of central and southern Ohio; and at Cincinnati and St. Louis becomes an autumn fruit.

Red Canada.—(*Syn.* nonesuch, old nonesuch of Massachusetts, Richfield nonesuch of Ohio.)—Medium in size, roundish-conical, regular; nearly the whole surface covered with red, and interspersed with large and rather indistinct whitish dots; stalk about an inch long, in a very wide and even cavity; basin nearly even, moderate; flesh fine-grained, compact, with a rich subacid, high, and excellent flavor. Keeps through winter. Shoots rather slender, leaves wavy. Productive; fruit smooth and fair. Succeeds equally in New England, New York, and Ohio. This is wholly distinct from the nonesuch of England, to prevent confusion with which the name Red Canada is preferred.

Northern Spy.—Large, roundish, slightly conical, often flattened, sometimes slightly ribbed, handsomely striped with red; stalk and calyx deep set; flavor mild agreeable, mild subacid, fine. Keeps through winter and late into spring; preserves its flavor remarkably fresh. Shoots dark, spotted, erect, stout. To afford fine fruit, the tree must be kept thrifty by good cultivation. A native of East Bloomfield, New York.

Spitzenburgh, Esopus.—Rather large, round-ovate, slightly conical; surface a high, rich red, rather obscurely striped; stalk three-fourths of an inch long, rather slender; basin shallow, slightly furrowed; flesh yellow, firm, crisp, spicy, rather acid, nearly unequaled in its high, rich flavor. Keeps through the winter. Shoots ascending and erect, rather slender, leaves crenate. Usually a moderate bearer. Succeeds best in New York, its native state.

Yellow Newtown Pippin.—Medium, or rather large, roundish, slightly oblong and oblique, more or less flattened; yellow, with a brownish-red cheek, purplish before ripe; stalk very short; flesh firm, crisp, with a rich, mild flavor. Closely resembles the green Newtown pippin, and believed by many to be identical, differing only by a warmer exposure. It is fairer in some localities than the green, but is usually inferior to it in flavor. The growth of the two varieties is only distinguished in the large trees.

Bailey Sweet.—(*Syn.* Patterson sweet, Edgerly sweet.) Large, regular-ovate, often slightly and sometimes considerably ribbed; the whole surface frequently a full bright red, in small, broken, indistinct stripes and dots, on light ground; stalk slender, one inch long; cavity small, narrow, slightly ribbed; basin small, plaited; flesh very tender, not juicy; a pure, mild, rich, sweet; fine. Early winter. Origin, Perry, Wyoming county, New York. New.

Tallman Sweeting.—(*Syn.* Tolman's sweeting.) Medium or rather large, roundish oblate, slightly conical; clear light yellow, with a clear brownish line from stalk to apex; stalk nearly an inch long; calyx in a distinct, slightly wrinkled basin; flesh white, firm, rich, very sweet. Excellent for winter baking. Keeps into spring. Young tree vigorous, upright, shoots becoming spreading; leaves wavy. Productive.

Ladies' Sweeting.—Rather large, roundish ovate, apex narrow; striped with red on pale yellowish-green ground, a nearly uniform shade of fine red to the sun; faintly marbled or clouded with white over the red; and cavity faintly rayed with white; stalk short, cavity small; calyx and basin small; tender, juicy, agreeable, fine, rich.

Sweet Russet.—Large, ovate-conical, largest at middle, tapering slightly to base, and much narrowed to apex; green becoming yellow, with patches of russet; stalk one-half to an inch long, cavity narrow; basin narrow, uneven; flesh tender, rather spongy, with a good and quite sweet flavor. Fair and productive. Considerably cultivated in western New York and elsewhere. Early winter.

THE SIX BEST WINTER APPLES recommended by the Ohio Pomological Society in 1857, are Rhode Island greening, Rambo, Esopus Spitzenburgh, Roxbury russet, Baldwin, yellow bell-flower.

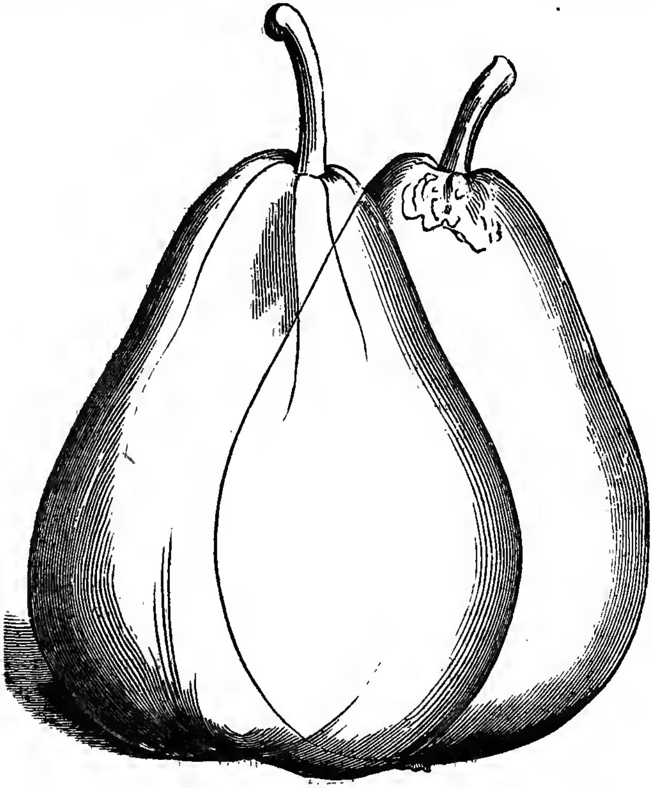
FRUIT FOR THE WEST.—Twenty Best Apples for an Orchard of 100 Trees.—Summer Apples.—Five red June, two sops-of-wine, five summer Permock, three red Astrachan, two Cooper's early white, two Leicester sweeting.

Fall Apples.—Three Tompkins, five Snow, two fall wine, three Hawley, two sweet wine, two cloth of gold.

Winter Apples.—Ten Dominie, ten Wagener, ten willow twig, two white bell-flower, two yellow bell-flower, ten New York pippin, ten red seek-no-farther, ten Swaar.

SELECT LIST FOR THE SOUTH.—**Summer Apples.**—Red June, Julian, bough, horse-apple, fall pippin, buffs, Meigs, Waddel's hall, or Shockley, Batchelor, or King.

Winter Apples.—Maverick sweet, Nickajack or Summerover, Callasaga, berry, Disharoon, Camak's sweet, never-fail, Mangum, red warrior, Carter.



THE PEAR.—SELECT VARIETIES.

The varieties of the pear, like those of the apple, are exceedingly numerous, some lists embracing over *a thousand different kinds.* We select only those of established excellence, and in sufficient number to meet the wants of general cultivators.

SUMMER PEARS.—**Bartlett.**—(*Syn.* Williams' Bonchretien.) Quite large, obtuse-pyriform, slightly obconic, surface wavy, clear yellow, sometimes a faint blush; stalk an inch and a fourth long, stout, slightly sunk; basin little or none; apex slightly plaited, sometimes smooth; flesh nearly white, very fine-grained, exceedingly tender and buttery, with a nearly sweet, sometimes faintly subacid, perfumed, fine, moderately rich flavor. Ripens in the end of summer and beginning of autumn; and far north, is strictly an autumn pear. The fruit, when not fully grown, ripens and becomes of good quality if kept in the house a week or two. Growth erect, vigorous, leaves folded, slightly recurved; shoots yellowish. Tree very productive and bears very young. Although not of the first class as to flavor, the many fine qualities of this pear render it a general favorite.

Tyson.—Size medium, often rather large, obconic-pyriform, sometimes approaching obconic-obovate; bright yellow, with a reddish-brown softly shaded cheek, often some russet; stalk an inch and a fourth long, inserted into a fleshy prominence abruptly contracted from the rounded neck; basin very shallow, even; flesh of fine texture, buttery, very melting, juicy; flavor nearly sweet, aromatic, slightly perfumed, excellent. Ripens the last two weeks of summer. Shoots quite dark-brown, erect, vigorous. The tree does not come soon into bearing. Pennsylvania.

Rostiezer.—Rather small, sometimes medium in size; obconic-pyriform, approaching obovate, regular; skin dull brownish-green, with a dark, dull, reddish-brown cheek to the sun, with whitish specks and traces of thin russet; stalk an inch and a half to two inches long, slender, scarcely sunk; basin little or none; flesh, juicy, melting, sweet, with a very high perfumed flavor, of high excellence. Ripens late in summer. For rich flavor it has scarcely an equal among summer pears. Shoots dark.

Madeleine.—(*Syn.* Citron des Carmes, Magdelen, green chisel, *incorrectly.*) Medium in size, obconic-obovate, obscurely pyriform; skin smooth, pale yellowish-green, rarely a faint brownish blush; stalk slender, an inch and a half long, cavity very narrow and small; basin very shallow; flesh very juicy and melting, usually faintly acid, with an agreeable, delicate, fine, refreshing flavor. Matures about mid-summer, or at the time of wheat harvest. Needs house-ripening. Shoots straight, erect, greenish, growth vigorous; tree rather liable to blight. Leaves quite flat.

Summer Doyenne.—(*Syn.* Doyenné d'Eté). Small; round-obovate, slightly turbinate; stalk an inch or an inch and a fourth long, rather stout, slightly oblique, not sunk; basin very shallow; skin a fine yellow, with a warm cheek brightly reddened at the crown; and with radiating stripes of greenish-yellow from the calyx; flesh melting, juicy, sweet, with a pleasant but not high flavor. Skin thin; core small; seeds small, white. Ripens with the Madeleine, and nearly equal to it in quality. Tree bears very young. Shoots slender, reddish-brown. New.

Bloodgood.—Size medium; turbinate, approaching obovate, base contracted abruptly to the stalk; yellow, touched with russet; stalk fleshy at insertion, an inch and a fourth long, set on the rounded base without depression; calyx scarcely sunk; flesh yellowish-white, buttery and melting, with a fine, rich, aromatic flavor. Sometimes rots at the core. On some soils the flavor becomes poor and insipid. Ripens immediately after jargonelle and skinless, or the first half of August. Like all early pears, it is best if house-ripened.

Dearborn's Seedling.—Scarcely medium in size, obovate turbinate, regular, smooth; surface clear yellow, with minute specks; stalk an inch long, sunk little or none, basin very shallow; flesh very fine-grained, juicy, melting, and of fine flavor. Ripens nearly with the Bloodgood, or middle of August. Shoots, straight, long, dark-brown. Tree bears when young; the fruit always fair and of first quality in nearly all localities.

Summer Frankreal.—(*Syn.* Franc Réal d'été). Size medium, short obovate, slightly pyriform, with a very short, obtuse neck, body slightly conical, or tapering to the crown; green, becoming pale yellowish-green, often a faint yellowish-brown blush; stalk three-fourths of an inch long, thick, slightly sunk; calyx closed, basin furrowed; flesh white, fine-grained, buttery, melting, rich, and fine. Late summer and early autumn. Shoots and leaves rather downy, leaves large.

AUTUMN PEARS.—White Doyenne.—(*Syn.* butter pear of Pennsylvania, Virgalieu of New York, St. Michael of Boston, yellow butter, white beurré, Doyenné, Doyenné blanc.) Medium or rather large, regular obovate, obtuse, sometimes remotely pyriform; surface pale yellow, often a faint blush; stalk about an inch long, scarcely sunk; calyx small, basin shallow; flesh of very fine texture, white, buttery, melting, rich and excellent. Middle to late autumn. Shoots ascending, grayish yellow; leaves folded, recurved. It fails in many localities near Boston and elsewhere, but through inland New York and in most of the Western states, it is unsurpassed in its excellent qualities of hardy growth, fair fruit, delicious flavor and great productiveness; many trees, without receiving any care in cultivation, yielding ten or fifteen bushels of perfect fruit in a single season.

Gray Doyenne.—(*Syn.* Doyenné gris, gray butter pear, red Doyenné, Doyenné rouge, St. Michael Dore.) Size medium, obovate, often approaching turbinate; whole surface a handsome smooth cinnamon russet; stalk half to three-fourths of an inch long, cavity quite narrow; calyx small, closed; flesh with a very fine texture, very buttery, melting, rich, perfumed, delicious, excellent. Middle of autumn to winter. Shoots yellowish or grayish brown, ascending. Fails on some localities.

Beurre Bosc.—(*Syn.* calebasse bosc.) Large, very distinct pyriform, neck rather long and very narrow, acute; body large oblate; surface nearly smooth, deep yellow, russeted in patches; stalk an inch and a half long, slender, curved; basin very shallow; flesh juicy, buttery, rich, perceptibly perfumed, sweet, excellent. Mid-autumn. Growth moderate, a regular, even bearer. Fails entirely on quince stocks. Belgian.

Seckel.—Small, obovate, sometimes obscurely obconic-pyriform, regular; skin brownish-green, becoming rich yellowish-brown, with a deep brownish-red cheek; stalk one-half to three-fourths of an inch long, cavity and basin small; flesh very fine-grained, sweet, very juicy, melting, buttery, the richest and highest-flavored pear known. Although of slow growth, and small size, like the green gage among plums, it is regarded as the standard of excellence. Its high musky perfume is not, however, agreeable to all. Early mid-autumn. Shoots stout, short, ascending, tree very hardy. Needs rich cultivation. Origin, near Philadelphia, and succeeds well throughout the Northern, Middle and Western states, and is remarkably free from the blight.

Louise Bonne of Jersey.—(*Syn.* Louise Bonne de Jersey, Louise Bonne d'Avranches.) Large, pyriform, neck somewhat obconic, body approaching oblong, tapering slightly to obtuse or flattened crown; slightly one-sided; surface smooth, pale yellowish-green, with a brownish-red cheek; stalk an inch to an inch and a half long, often fleshy at insertion, little sunk; basin shallow, flesh yellowish white, very juicy, buttery, melting, rich, faintly subacid, fine. Ripens mid-autumn; late autumn far north, early autumn at Cincinnati. Very productive; succeeds admirably and grows with great vigor on quince stocks, and should be worked on no other. Shoots dark brown or purple; serratures of the leaves rather coarse. This fine variety, like the Bartlett, is hardly of the highest quality, but is eminently valuable for its large, fair fruit, free growth, and great productiveness.

Paradise D'Automne, or Autumn Paradise.—Rather large, distinct pyriform; surface uneven, yellowish orange, with some thin russet patches; stalk an inch and a half long, not sunk; basin small, irregular; flesh melting, very buttery, with a rich, high and excellent flavor. Ripens about mid-autumn. Shoots yellowish, at first upright, afterward becoming straggling, growth vigorous. This pear resembles the Beurré Bosc, but is less smooth, more irregular in form, has a less narrow neck, is more melting and sprightly, and of more vigorous growth.

WINTER PEARS.—Winter Nelis.—(*Syn.* Nelis d'hiver, Bonne de Malines.)—Size medium; roundish-obovate, often slightly pyriform, with a neck small and short; surface yellowish-green, much russeted; stalk an inch and a quarter long, bent; cavity narrow; calyx stiff, short, basin shallow; flesh yellowish-white, fine-grained, buttery, very melting, rich, sweet, or slightly vinous, perfumed, aromatic, with an excellent flavor. Perhaps the highest-flavored of all winter pears. Early winter. Growth slender, often flexuous and straggling; leaves narrow, recurved; petioles rather long. Origin, Mechlin, in Belgium.

Beurre d'Aremberg.—(*Syn.* Duc d'Aremberg, Deschamps, l'Orpheline.) Large, short obconic-pyriform, approaching obconic-obovate, neck rather small; skin thick, greenish-yellow, partly russeted; stalk short or moderately sunk; basin deep, uneven, or angular; flesh buttery, melting, sugary, with a fine flavor. Requires warm, rich cultivation, to develop its good qualities. Shoots long, slender, dark brown. Grows well on the quince. Early winter. Old French.

Prince's St. Germain.—Size medium; obovate, obtuse; surface much russeted on green, dull red to the sun; stalk an inch and a fourth long, cavity small; calyx large, stiff, slightly cut, basin smooth, shallow; flesh yellowish-white, juicy, melting, slightly vinous, with an agreeable and fine flavor. Keeps well, ripening through winter. Origin, Flushing, Long Island.

Beurre Gris d'Hiver Nouveau, or Gray Winter Beurre.—Size medium; obovate, obtuse; skin greenish, considerably russeted; stalk thick, short, cavity moderate; basin small; flesh greenish, buttery, melting, very juicy, rich, slightly subacid—resembling in flavor the beurré d'Aremberg, but rather richer and less acid. Early winter. French. New. Promises to become valuable.

Vicar of Wakefield.—(*Syn.* Le Curé, Monsieur le Curé, Clion, Dumas.)—Quite large; long pyriform, approaching oblong-obconic, with a conical taper toward the crown; skin smooth, pale yellow, or pale yellowish-green, with a dull reddish cheek; stalk an inch to an inch and a half long, slender, often fleshy at insertion, oblique, not sunk· basin narrow, very shallow· flesh greenish or yellowish-white, juicy, buttery, with a good, second-rate flavor—sometimes slightly astringent, but if ripened in a warm temperature, it proves a good table pear. Ripens late autumn and early winter, for about three months. Growth spreading and irregular, or straggling; shoots strong, dark olive. Fine on quince stocks. The great and uniform productiveness of this pear, its fine qualities for cooking, and the long period of its continuance, render it eminently valuable.

It was formerly cultivated at Boston under the erroneous name of Bourgermester. The true Bourgermester is a third-rate pear, the wood of which cankers badly.

Select List of Pears for Southern Cultivation.—Madeleine, Bloodgood, Dearborn's seedling, St. Ghistlain, Stevens' Genesee, golden beurré of Bilboa, Napoleon, Bartlett, Seckel, white Doyenné, Dutchess d'Angoulême, belle Lucratim, beurré Bosc, beurré Diel, Glout Morceau, winter Nelis, beurré d'Aremberg.

Dwarf Pear.—These are chiefly valuable where but little space can be had, as five dwarfs can be grown on the area occupied by one standard, and another advantage is, that they come earlier into bearing. They may be planted from six to ten feet apart, and the stocks should be entirely beneath the surface, to avoid the borer, which will attack the quince, but not the pear. They need, and will reward, rich cultivation and careful pruning. They should be pruned in the pyramidal form, for which the following are good directions:

"The process consists in shortening the first year's shoot of the apple or pear tree, called the graft-shoot, to one foot at a full bud. The first year, on pushing out in spring, rub off all laterals, except four or five at the bottom of the stem, to garnish it with a first tier of branches for future years. Train the leader to a stick quite perpendicular. The next winter proceed as before, by shortening the leader twelve inches at a full bud. Remove all intermediate buds as before, down the leader, and leave those at the bottom to form a second tier of laterals; and shorten the lower tier to an outside bud. After the second year's shoot, the summer pruning consists in rubbing off the laterals forming now the lower tier, above and below the branch, so as to keep them as horizontal as possible. Strengthen those that grow horizontal by pinching off the ends, if necessary. Each tier should be, as near as may be, twelve or thirteen inches one above the other; and, if possible, the branches of each succeeding tier should be so grown as to be above the intervals of the tier below. This makes a beautiful symmetrical tree, ornamental even in a flower-garden."*

Varieties.—The following are good varieties: summer Dean, Doyenné d'Eté, English jargonelle, Madelaine, long green of autumn, beurré Diel, glout morceau, white Dean or white Doyenné, gray Dean or gris Doyenné, striped long green of autumn, weary soldier or soldat laboureur,

* *Gardener's Chronicle.*

DWARF PEAR-TREE. (See page 161.)

Van Mons' Léon Le Clerc, summer Franc Real, Bartlett, beurré d'Amalis, Louise Bonne of Jersey, Vicar of Wakefield, Angoulême, Duchess of

Angoulême, Easter beurré, Duchess of Orleans, beurré of Anjou, Boussouck, Doyenné Boussouck, passe Colmar.

Diseases.—The blight is the only formidable enemy to pear culture; and the remedy is an early, constant, and thorough excision and burning of all diseased wood. This generally results in saving the tree, and if continued by cultivators, also in the destruction of the causes of the disease.

THE PEACH.—VARIETIES.

Serrate Early York.—(*Syn.* true early York, early York of Downing, early purple erroneously.) Size medium, roundish-oval, suture slight; dotted with red on greenish-white in the shade, dark red to the sun; flesh very tender and full of juice, rich, with a faint mingling of acid. Quite early, or middle of month of August. Growth rather free for a serrate-leaved peach. Very productive, and from its earliness, of great value. Differs from the large early York by its large flowers, cut leaves, oval fruit, and earlier maturity.

Large Early York.—(*Syn.* early York of New Jersey, Honest John.) Large, roundish, inclining to oblate in fully grown specimens, nearly white in the shade, with red dots, and with a deep red cheek to the sun; flesh nearly white, fine-grained, very juicy, with mild, rich, excellent flavor.

The New York Rareripe, (a name which has been more or less applied to nearly all the early red peaches sent to New York market,) or Livingston's New York rareripe, is usually regarded as identical with the large early York, but T. Hancock, of Burlington, considers them distinct—the New York rareripe being rather superior, and ripening three days later. Haines' early red closely resembles, if it is not identical with large early York.

Early Tillotson.—Size medium; round or nearly globular; thickly dotted with red on a nearly white ground in the shade, dark deep red in the sun; flesh whitish, red at the stone, to which the flesh partially adheres—juicy, rich, high-flavored, more of a nutmeg and less of a vinous flavor than the serrate early York, and ripening about the same time or a few days earlier, or the early part and middle of August. Its time of maturity is often somewhat variable, even on the same tree.

Bergen's Yellow.—Very large, round, slightly oblate; suture distinct, passing more than half round; surface deep orange, with a broad deep red cheek; flesh juicy, rich, excellent. Ripens the first of autumn. This is perhaps the finest of all yellow-fleshed peaches. Origin, Long Island, New York.

It differs from the yellow rareripe in its more oblate form, darker color, superior flavor, and later maturity, and in its reniform glands.

Columbia.—Large; roundish-oblate; suture distinct, passing half way round; skin rough, rather thick, dull dingy red, with spots of darker red; flesh yellow, rich, juicy, of excellent flavor. Origin, New Jersey. Ripens early in autumn. Shoots, dark reddish purple.

Brevoort.—(*Syn.* Brevoort's Morris, Brevoort's Seedling Melter). Medium or large, round and slightly oblate, suture distinct, deep at apex; skin nearly white or with a faint dingy hue, with a bright-red cheek; flesh rather firm, slightly red at stone, rich, sweet, and high-flavored. First of autumn. Moderately and uniformly productive. Origin, New York.

Grosse Mignonne.—Large, roundish, slightly oblate; apex depressed, with a deep suture; skin tinged with greenish-yellow, mottled with red and with a purplish-red cheek; flesh reddened at the stone, juicy, with a very rich, high, and somewhat vinous flavor; stone small, very rough. Early—the last two weeks of summer. Of French origin. The peach usually cultivated in this country under this name, although an excellent variety, is not the genuine grosse mignonne, but differs in its small flowers.

Early Admirable.—(*Syn.* admirable; belle de Vitry, *erroneously*). Size medium; nearly round; skin nearly white, with a red cheek; flesh red at the stone, juicy, rich, sweet, fine. Quite early, ripening immediately after serrate early York. French.

Crawford's Early.—(*Syn.* early Crawford, Crawford's early melocoton). Very large, oblong-oval, sometimes round-oval; apex with a prominent point; suture shallow; surface yellow, with a red cheek; flesh very juicy, rich, slightly subacid, of good but not the highest flavor. End of summer and beginning of autumn. Productive. Ranks very high in the Northern, Middle and Western states, as a market variety. Origin New Jersey.

Crawford's Late.—(*Syn.* Crawford's late melocoton, Crawford's superb melocoton). Very large, roundish, suture shallow, distinct; surface yellow, with a broad, dark-red cheek; flesh red at the stone, rich, juicy, vinous, hardly first-rate. Quite late, or latter part of September. Productive; and ranks among the first as a late variety for market. Origin, New Jersey. The common red-cheeked melocoton is cultivated in some localities under this name.

Jaques' Rareripe.—Very large, roundish, slightly oblate, suture distinct, one side slightly larger, surface a little uneven; surface deep-yellow, variously shaded with red; flesh deep-yellow, red at the stone, of good but not of the highest flavor. Shoots diverging. Ripens at the end of summer. Origin, Massachusetts.

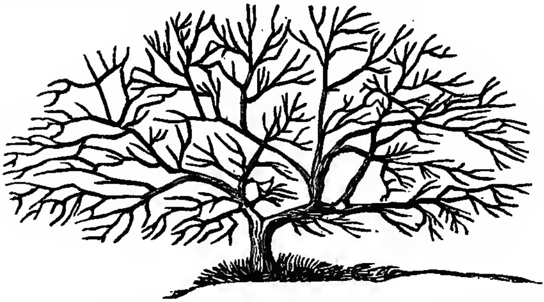
Early Newington Freestone.—Size medium; roundish, one half always larger, suture distinct; surface nearly white, dotted and streaked with red, the cheek a rich red; flesh white, red at the stone, at first wholly adhering, but as it ripens, partially separating from it; juicy, rich, fine. A valuable early variety, ripening immediately after the serrate early York.

INSECTS, DISEASES, ETC.—Curl of the Leaf.—This is produced by a small plant-louse puncturing the leaves on their first growth in the spring, causing them to curl and often to fall off. Though the tree afterward sends out new and fresh leaves, yet the effect is generally to diminish or destroy the fruit for the year, and, in the end, to greatly injure the health of the tree. *Remedy.*—A mixture of tobacco-water and strong soap-suds, applied with a syringe when the leaves are about one-third grown.

The Yellows.—This is the most formidable disease which attacks the peach. It is contagious, and spreads with great rapidity, by the buds, by contact of roots or by the knife used upon diseased trees. It shows itself by the premature ripening of the fruit, which is of small size and of poor flavor, by the leaves turning yellow and falling, ending in the death of the tree. Where the disease has made much progress, the tree should be cut and burned to prevent its extension, as the disease cannot be cured when fully developed. Sickly trees may be revived by the application to the roots of iron-filings or of copperas. Shortening the branches, the application of unleached ashes and iron-filings are the best preventives.

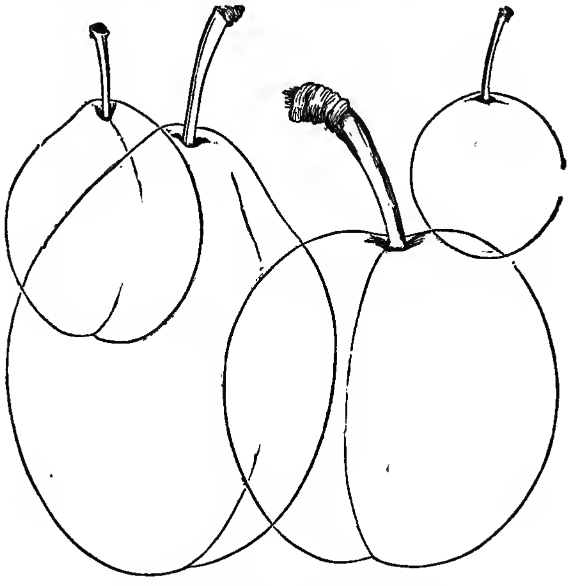
The Peach-Worm or Borer.—This insect cuts into the bark but not into the wood, just beneath the surface, causing the gum to exnde, and by which its depredations are easily discovered. It can be removed with a knife without difficulty. By piling in the spring about the body of the tree a small quantity of ashes or air-slacked lime, to be removed in the fall, has been found a good remedy. This insect need not be dreaded by careful cultivators. It is easily destroyed if attention be given to it.

Pruning.—Next to the grape, probably no fruit-bearing tree is more benefited by judicious pruning than the peach; yet in none, perhaps, is it more neglected.



The practice is, to plant the trees and let them grow in their own way. The consequence is, that in a few years it runs up to a long, ragged stem, with two or three long, ragged limbs, having some little weak boughs at the tops, and the tree being top-heavy, is, nineteen times in twenty, blown down; and it presents, altogether, a figure by no means handsome in itself or creditable to its owner. That is not the true way. The tree should, in the first place, be budded very near to the ground; after planting cut it down very near to the ground, about one foot six inches from it. Always cut sloping and close to a bud. In this foot and a half there will be various buds, and they will, the first summer, send out many

shoots. Now, when shoots begin to appear, rub them all off but *three*, leaving the top one on each side at suitable distances lower down. These will in time become limbs. The next year top the upright shoots, so as to bring out other horizontal limbs, pointing in different directions from those that came out last year. Thus the tree will become spreading. After this, you must keep down the aspiring shoots; and every winter cut out some of the old wood. See, and contrast the trees represented on the preceding page. By this management the peach-tree lives as long as the apple or any other fruit tree. It is constantly reproducing itself, always in full bearing, always young.



THE PLUM.—VARIETIES.

Washington.—(*Syn.* Bolmar, Bolmar's Washington.) Large, often very large, roundish oval, suture obscure, distinct at base; surface yellowish-green, faintly marbled, often with a pale-red blush; stalk one half to three-fourths of an inch long, slightly downy; cavity wide, shallow; flesh rather firm, sweet, mild, moderately rich, free from the pointed stone. Rather early, or the last fortnight of summer. Shoots downy, very vigorous, leaves very large. Origin, New York city. This variety although not high in flavor, is a general favorite for its free growth, great productiveness, beauty, fine texture, and adaptedness to all soils.

Imperial Gage.—(*Syn.* Flushing gage, prince's imperial gage, white gage, of Boston.) Fruit rather large, oval, suture distinct; stalk three-fourths of an inch long, slightly hairy, evenly sunk; surface green, slightly tinged yellow, with marbled green stripes; bloom copious, white; flesh greenish, juicy, melting, rich, sometimes adhering, but usually nearly free from the oval, pointed stone. Ripens first of autumn. Very productive. Shoots are long, upright, vigorous, slightly downy; leaves with a slight shade of blue. Often insipid on heavy soils. A single tree, near Boston, yielded fifty dollars' worth of fruit in one year.

Jefferson.—Large, oval, base slightly narrowed, suture slight; greenish-yellow, becoming golden-yellow, often faintly reddened to the sun, bloom thin, white stalk an inch long, sunk little or none; flesh rich yellow, moderately fine-grained, in well-ripened specimens orange, very juicy, nearly free from the long, pointed stone; flavor rich, luscious, excellent. As large as the Washington, and though inferior to the green gage and some others in flavor, it is one of the most valuable of all plums. Ripens in the end of summer. Origin, Albany. Shoots smooth. growth closely resembles Coe's golden drop.

Green Gage.—(*Syn.* Reine Claude, Bruyn gage.) Rather small; round; suture faint; surface green, becoming yellowish-green, usually with reddish-brown dots and network at base; stalk half to three-fourths of an inch long, scarcely sunk; flesh pale-green; melting, juicy, exceedingly sweet and rich, and unequaled in flavor. Ripens about the middle of August; shoots smooth.

Coe's Golden Drop.—Very large (often more than two inches long), oval, suture distinct, one side more enlarged, necked; light yellow, often dotted red to the sun; stalk three-fourths of an inch long, rather stiff; flesh yellowish, rather firm, rich, sweet, not fine-grained, closely adhering to the pointed stone. Quite late, does not always ripen at the north—requires a long season. An excellent late sort, of English origin. Shoots smooth, rather glossy.

Purple Gage.—(*Syn.* Reine Claude Violette, Violet Queen Claude.) Size medium, roundish, slightly flattened at ends, suture distinct, shallow; surface violet, bloom light blue; stalk an inch long, cavity narrow; flesh rather firm, greenish-yellow, rich, sugary, of very high and excellent flavor.

Purple Favorite.—Size medium, or rather large, round, obovate; suture obsolete; skin brownish purple; bloom thin, light blue; stalk three-fourths of an inch long, scarcely sunk; flesh pale-greenish, juicy, tender, melting, rich, sweet, excellent, free from the very small, roundish stone. Season about medium, or last week of summer. Shoots nearly smooth, short-jointed, growth slow, much resembling that of the red diaper. Origin, Newburgh, New York.

Lombard.—(*Syn.* Bleecker's scarlet.) Size medium, sometimes rather large, round-oval, slightly flattened at ends, suture obscure; skin violet red; stalk very slender, half to three-fourths of an inch long, cavity broad; flesh deep yellow, pleasant, not rich, but of fine quality. Rather early or medium in season, ripening a week or two before the end of summer.

Royale Hative, or Early Royal.—(*Syn.* Mirian.) Size medium, roundish, slightly wider at the base; skin light purple, stalk half an inch long, stout, scarcely sunk; flesh amber-yellow, with a rich, high flavor, nearly free from the small, flattened, ovate stone. Very early. Resembles purple gage, but a month earlier. Shoots very downy. French. New. Rare.

Howell's Early.—Rather small, oval, slightly angular, suture obsolete; skin light brown, often greenish-yellow in the shade; bloom thin, blue; stalk three-fourths of an inch long, slender, not sunk; flesh amber-colored, juicy, sweet, perfumed, free from the small oval stone. Quite early, ripening a little before the Morocco and early Orleans. Shoots slender, gray, downy. Tree very productive. Newburgh, New York.

Orleans Early.—(*Syn.* New Orleans, Hampton Court, Monsieur Hatif.) Size medium, round oval, suture shallow, stalk half an inch long, stout, or longer and slender; cavity moderate; skin reddish-purple, slightly marbled; flesh yellowish-green, rather rich. Quite early.

DISEASES, INSECTS, ETC.—The Black Knot, or Black Gum.—The remedy for this is to cut away and burn all the affected portions of the bark or wood. When it appears on the bodies or large limbs, all the diseased wood is to be cut away and the wound washed with a solution of copperas or strong brine. Leached wood-ashes and salt liberally applied to plum-trees promote their health and growth.

The Curculio is the great enemy of the plum, as of other stone fruits It commences its work when the fruit is about the size of a pea. It makes a crescent-shaped incision in the fruit, in which it deposits its egg, which soon hatches into a small white larva, which feeds upon and destroys the fruit. The insect falls with the fruit, and enters the ground, from which it emerges the following spring in the form of a beetle. They can fly only during quite warm weather and in the heat of the day. Early in the morning they are nearly torpid; and this is the time to destroy them.

Remedy.—The only effectual remedy is to jar them from the tree while in the act of depositing their eggs upon sheets spread beneath the tree. The following from the "Fruit Culturist," is worthy of general attention:

"A quick and sudden jar is important, and may be given by the stroke of a mallet, upon the short stump of one of the smaller limbs, sawed off for this purpose, and which prevents bruising the bark. Or a mallet may be thickly covered with woolen cloth encased in India rubber, to prevent injury to the tree; but the jar is less sudden in this case. David Thomas, (who first proposed jarring down on sheets,) in a communication to the *Genesee Farmer*, in 1832, says: 'Not three days ago, I saw that many of the plums were punctured, and began to suspect that shaking the tree was not sufficient. Under a tree in a remote part of a fruit garden, having spread the sheets, I therefore made the following experiment: on shaking it well, I caught five curculios; on jarring it with the hand, I caught twelve more; and on striking the tree with a stone, eight more dropped on the sheets. I was now convinced that I had been in an error; and calling in the necessary assistance, and using a hammer to jar the tree violently, we caught, in less than an hour, more than two hundred and sixty of these insects.' With large trees, it may be necessary to shake each limb separately, by means of a pole with the woolen and India rubber knob, already described, at its extremity.

"The best time for this work is in the cool of the morning, when the insects are partly torpid with cold, and drop quickly. At mid-day they retain their hold more tenaciously, and more quickly escape. The work should be commenced very early in the season, as soon as the fruit begins to set, or is not larger than a small pea. With properly stiffened muslin frames, a few minutes are sufficient for many trees, and labor equal in the aggregate to that of a single entire day, may save large and valuable crops."

The confinement of swine or fowls beneath the trees, though not so certain a remedy as the preceding, is often effectual in saving the fruit.

Grafting of the plum should be done quite early in the season, and budding as soon after midsummer as properly matured buds can be had.

THE CHERRY.—VARIETIES.

Rockport Bigarreau.—Quite large, round heart-shaped; color, when fully ripe, a beautiful clear red, shaded with pale amber, with occasional spots; stalk an inch and a half long, cavity wide; flesh firm, juicy, sweet, rich, with an excellent flavor. Season rather early. Tree upright, vigorous. Origin, Cleveland, Ohio; one of the best of Dr. Kirtland's new seedlings.

Bigarreau or Graffion.—(*Syn.* yellow Spanish, white bigarreau of Massachusetts.)—Very large, often an inch in diameter, obtuse heart-shaped, very smooth, regular, base flattened; surface clear, pale waxen yellow, with a handsome light-red cheek to the sun; stalk an inch and three-fourths long, cavity very wide, shallow; flesh firm, with a fine, rich flavor. Season medium, or last of June. Shoots stout, diverging or spreading. This variety, although not of the highest flavor, has become, from its great size, beanty, and productiveness, a general favorite.

The late bigarreau, which originated with Dr. Kirtland, of Cleveland, resembles this, but is slightly less in size, deeper red, and ripens about ten days later.

Cleveland Bigarreau.—Very large, round heart-shaped, suture broad and deep half way round; color bright, clear, delicate red, or amber yellow; stalk an inch and a half long, curved; flesh firm, juicy, sweet, very rich. Season early, or with black Tartarian. Resembles the graffion, but ten days earlier. Origin, Cleveland, Ohio. New.

Elton.—Large, pointed, heart-shaped, somewhat oblong, pale yellow blotched, and shaded with red; stalk two inches long, slender; flesh firm, becoming rather tender, rich, high-flavored, excellent. Season medium, or rather early. Growth spreading, rather bending; petioles reddish-purple. A cross between the graffion and white-heart. One of the finest of cherries. English. Rather tender in very severe climates.

Downton.—Large, round heart-shaped, apex quite obtuse, or slightly indented; light cream-color, stained with red; stalk an inch and three-fourths or two inches long, slender; cavity wide; flesh yellowish, tender, adhering slightly to the stone, rich, delicious. Season medium, or rather late. Growth rather spreading.

Black Tartarian.—(*Syn.* Frazer's black Tartarian, black Circassian, black Russian, Ronald's large black-heart, Ronald's heart.) Quite large.

(often an inch in diameter), on crowded old trees only medium; heart-shaped, often rather obtuse, surface slightly uneven, nearly or quite black; stalk an inch and a half long, slightly sunk; flesh dark, half tender, with a peculiar liver-like consistency, rich, nearly destitute of acid, of very fine, but not of the highest, flavor. Ripens early, or about the middle of June. Shoots very erect. The vigorous growth and great productiveness of the tree, and the large size and mild, sweet flavor of the fruit, render this variety a general favorite.

Knight's Early Black.—Large, obtuse, heart-shaped, surface slightly uneven, black; stalk an inch and a fourth or an inch and a half long, rather stout, cavity deep, narrow; flesh dark purplish-crimson, tender, juicy, with a very rich, high, excellent flavor. Ripens quite early, or a little before the black Tartarian. Shoots diverging or spreading. Much resembles the black eagle, but larger, earlier, more heart-shaped, and with a much deeper cavity. English. In some localities, it appears to need a rich soil and warm situation to develop its excellence.

Mayduke.—Large, roundish, obtuse heart-shaped; color red at first, becoming, when mature, nearly black; flesh reddish, becoming dark purple, very juicy, and melting, rich, acid, excellent. It is frequently picked, when red, immature and not fully grown, and imperfect in flavor. Quite early—but often varying greatly and permanently in its season of ripening, even on the same tree. Holman's duke and late Mayduke are only late variations perpetuated by grafting. Growth upright for a duke. Very hardy, and adapted to all localities.

Royal Duke.—(*Syn.* royal tardive.) Very large, roundish, distinctly oblate, surface dark-red; flesh reddish, tender, juicy, rich; season rather late. Growth like the Mayduke. Rare.

Plumstone Morello.—Large, roundish heart-shaped; color deep red; stalk an inch and a half long, slender, straight; cavity moderate; flesh reddish, of a rich acid flavor. Very late, or after midsummer. Stone rather long and pointed. The most valuable of the Morellos.

INSECTS, DISEASES, ETC.—The Curculio, Caterpillar, and Aphis, which have already been described, and the modes of their destruction pointed out, also attack the cherry. The cherry-slug sometimes does much injury by eating the leaves. They may be repelled by dusting the leaves regularly with ashes when wet with dew.

Grafting, to succeed, must be done very early in the spring, before any swelling of the buds. Budding about midsummer, and just as the terminal buds begin to form.

APRICOTS—VARIETIES.

Moorpark.—(*Syn.* Anson's, Dunmore's Breda, Temple's.) Large, (two inches in diameter,) nearly round, slightly compressed; surface orange, with a deep orange-red cheek, and with numerous darker dots; flesh free from the stone, bright yellowish orange, rather firm, quite juicy, with a rich, high flavor. Stone perforate, or with a hole lengthwise under one edge, so that a pin may be thrust through. Season medium, or two weeks after midsummer. Requires the shortening-in pruning recommended for the peach. English. Old.

Breda.—(*Syn.* Holland, Amande Aveline.) Rather small, sometimes nearly medium, (an inch and a half diameter,) roundish, obscurely four-sided, suture distinct; surface orange, with a dark reddish orange cheek; flesh deep orange, free from the stone, rich and high-flavored. Quite early, or a week or two after midsummer. Hardy for an apricot, and very productive.

Peach.—(*Syn.* Anson's imperial, Pêche, De Nancy.) Very large, slightly larger than Moorpark; yellowish orange, with a brownish orange cheek, and mottled with dark brown to the sun; flesh a rich yellow, juicy, with a rich, high flavor. Stone perforate. Ripens about the time of the Moorpark, which it closely resembles, but is of larger size. Origin, Piedmont.

Large Early.—Size medium; oblong, compressed; suture deep; slightly downy; pale orange, with a spotted bright orange cheek, very handsome; flesh free from the stone, pale orange, rich, juicy. Ripens at or a little before midsummer. Origin, south of France.

Culture, the same as the peach.

INSECTS.—The mode of protection is the same as that for the plum. The tree should be planted not on the south or east side of buildings, but on the west or north, as they are less liable in the latter positions to be destroyed by spring frosts, and when their blossoming is being retarded by their position, they are less liable to the attacks of the curculio. The apricot is a hardy tree comparatively, that is, it is more hardy than many of our early peaches, and, if care be taken in the way suggested, to protect the fruit from destruction by frost and the curculio, large crops of this delicious midsummer fruit may be obtained.

Budding is best done on plum stocks and on light soils; those of the wild plum should be chosen.

THE NECTARINE.—VARIETIES.

The nectarine resembles though it is inferior to the peach. Its fruit is more subject to destruction from the ravages of the curculio—being in that respect similar to the apricot. Its mode of cultivation, soil, etc., are the same as those for the peach.

Early Violet.—(*Syn.* violet hative, aromatic, new scarlet, large scarlet, early brugnon, violet musk, violette musquée.) Size medium; roundish, apex slightly narrowed, suture shallow; skin with a dark purple red cheek and brown dots, on pale yellowish-green; flesh whitish, much reddened at the stone; stone roundish, moderately rough, reddish or reddish brown; flesh melting, rich, high-flavored, and aromatic; of the finest quality. Season medium or end of summer. Distinguished from Elruge by its redder flesh and stone, and darker skin.

The Large Early Violet, or Violette Grosse, differs in its larger size and rather inferior flavor.

Elruge.—Medium in size, roundish-oval; suture slight, distinct at apex; skin a dark red, or deep violet on a greenish-yellow ground, with minute brownish dots; flesh greenish-white, slightly, sometimes scarcely stained with pale red at the stone; juicy, rich, high-flavored; stone rough, pale. Season about medium, or first of autumn. This is one of the best and most celebrated of nectarines.

New White.—Rather large, nearly round; skin white, often a slight tinge of red; flesh white, tender, juicy, rich, vinous; stone small. Season medium or first of autumn. English.

Downton.—Medium in size, roundish-oval, pale green, with a deep violet-red cheek; flesh pale green, slightly red at the stone; melting, rich, excellent. Ripens end of summer. This is perhaps the best flavored of all the nectarines. English.

Hunt's Tawny.—Nearly medium size, roundish-ovate, narrowed and pointed at apex, one side slightly enlarged; skin, a dark-red cheek on pale orange, with numerous russet specks; flesh deep orange, rich, juicy, good. English. Valuable for its early maturity, ripening quite early, or three weeks before the close of summer. Often mildews badly.

Early Newington.—(*Syn.* black, early black, Lucombe's seedling.) Large, roundish-ovate, one side slightly enlarged, apex pointed; skin pale green, nearly covered with bright red and with darker marblings and dots; flesh greenish-white, deep red at the stone, juicy, with a fine rich flavor. First of autumn.

Its enemies, diseases, etc., are the same as those of the peach, which see.

PACKING APPLES FOR SHIPPING.—Messrs. Chas. R. Huntington & Co., New York, give the following directions for packing and shipping green apples:

"**Green Apples,** if designed for shipment to New York or any other market, should be carefully picked by hand from the trees, in baskets which will contain about half a bushel, and always handled with great care, studiously avoiding the slightest bruise.

"Good strong barrels, that will hold two and a half bushels, should be made expressly and brought into the orchard, which is the place above all others most desirable for packing. Let each barrel be packed under the supervision of a faithful, practical man, in the following manner: *First, put in a layer of smooth, uniform-sized fruit, regularly laid in tiers upon the head that is to be branded or opened in market,* proceed to fill the barrel, with the baskets small enough to be admitted into the barrel, and empty, (this is to avoid the certain bruises caused by filling from the top.) Shake the barrel frequently, and when full arrange the apples so that the head will rest upon them smoothly, and in order to secure them from shucking in the barrel. It is necessary to have it so well filled as to require hard pressing to get the head into the crozen.

"A cheap and economical press may be arranged thus—secure to a tree, or post, a loop, either rope or leather, at the right point to receive one end of a hickory pole ten or fifteen feet in length, and let it rest upon three or four pieces of plank laid across the head, one upon the other, cut about the length of the head, and thick enough to give the right purchase to the lever or spring-pole. In this manner apples (or potatoes) may be packed so as to stand railroad or any other transportation, and being in prime order will always command a quick sale at good prices. They should be assorted, and all wind-fall, wormy, small knurly, and poor common fruit rejected."

HARDY FRUITS AT THE WEST.—The late unusually severe winters at the West have enabled the residents to discover the hardy varieties of fruit, as those which have escaped unscathed may with safety be so classed. The following list, made up from intelligent correspondents of the *Annual Register*, may be relied on for endurance in future years.

Apples.—I. C. ALLEN, of Lena, Ill., furnishes the following results of his experience: *Very hardy*—Oldenburgh, late strawberry. *Hardy*—Early Joe, early Pennock, sops-of-wine, Cooper, Fulton, fall orange, mother, Fallawater, Hubbardston nonesuch, Jonathan, limber-twig. *Tender*—early harvest, summer bell-flower, Belmont, Hawley, Jersey sweeting, Rambo, twenty-ounce, Baldwin, Dominie, English russet, King, Newtown pippin, golden sweet.

E. ORDWAY, of Freeport, Ill., gives the following list of such varieties as have withstood the late severe winters there: Tallman sweeting, yellow bell-flower, seek-no-further, golden russet, Northern spy, white winter pearmain, wine-sap, Fallawater, maiden's blush, red Canada, sops-of-wine, and large and small Romanite.

SAMUEL EDWARDS, La Moille, Ill., gives the following as the most hardy and valuable: red June, high-top sweeting, hocking, early Pennock, Keswick codlin, maiden's blush, fameuse, Westfield seek-no-further, yellow bell-flower, white winter pearmain, Fulton, red Romanite.

DR. S. L. PENNINGTON, Sterling, Ill. *Hardy*, or but slightly injured—yellow bell-flower, Westfield seek-no-further, fameuse, black Detroit, wine-sap, pomme grise, Lowell, red June, willow-twig, early nonpareil. *Tender*—Baldwin, Porter, Rhode Island greening, Roxbury russet, Ortley, sweet-bough, Rambo.

E. H. SKINNER, McHenry Co., Ill. For *summer*—Red Astrachan and Carolina red June. For *autumn*—Porter. *Early winter*—fameuse. *Winter and spring*—Jonathan, Rawles' Janet, English russet.

J. S. SHERMAN, Rockford, Ill. Sweet June, Baldwin, Tompkin's County King, Wagener, and most of the hardiest in Western New York, except Rhode Island greening, and sweet-bough. Maiden's blush and yellow bell-flower succeed admirably.

B. W. STEERE, of Adrian, Mich., mentions as particularly *tender*, English and Roxbury russets, Gravenstein, Baldwin, and Rhode Island greening—the latter becomes hardier with age, but is an uncertain bearer.

AMASA STEWART, of Le Seur, Minnesota. Early harvest, early strawberry, red Astrachan, maiden's blush, fameuse, Harrison, white bell-flower. The Rambo was tender.

F. K. PHŒNIX, Bloomington, Ill., who has also made extensive observations in Wisconsin, names the following hardy apples: *Summer*—Carolina June, sweet June, red Astrachan, sops-of-wine, Benoni, summer pearmain. *Autumn*—autumn strawberry, Dyer, fall orange, Haskell sweet, Gabriel, Northern sweet, Oldenburgh, St. Lawrence. *Winter*—yellow bell-flower, Carthouse, limber-twig, Romanstem, white winter pearmain, seek-no-further, Tallman sweet, wine-sap, monstrous pippin, English golden russet, willow-twig, winter sweet paradise, Campfield sweet.

OHIO POMOLOGICAL SOCIETY, 1857, from the report of various members: Carolina red June, fine in Central Indiana, poor in southern

Michigan; late strawberry, good in Ohio, Indiana, and Illinois; American summer pearmain, generally and highly esteemed; Hawley, promising well; maiden's blush, everywhere hardy and productive; Fallawater, second quality, but everywhere valuable; white pippin, one of the best for central and southern Ohio; white winter pearmain, highly prized in Indiana and Illinois, unknown in Ohio; Pryor's red and Rome beauty, southern Ohio; red Canada, northern Ohio. The following sorts have generally done well: Winter sweet paradise, Broadwell, Tallman sweet, Danver's sweet. The Northern spy had done well in Kentucky, St. Louis, and Indiana, although diminished in keeping qualities.

In addition to the preceding lists, the following has been furnished by M. R. PATRICK, of Sackett's Harbor, N. Y., a place remarkable for its intense winters and severe winds. *Vigorous growers and perfectly hardy*—Hawthornden, sops-of-wine, late strawberry, Jewett's red, Orne's early. *Nearly as hardy*—Early harvest, summer queen, fall orange, Hawley, King (Tompkin's), American golden russet, Swaar, Benoni, red Astrachan, Ribston pippin. *Somewhat tender*—Rambo, Dyer, Gravenstein, fameuse. *Half hardy*—Jonathan, Dominie, sweet Baldwin, Danver's sweet, Belmont, Canada Reinette, yellow bell-flower. *Tender*—Baldwin, twenty-ounce, Tallman sweet, fall pippin, sweet-bough, summer rose, early strawberry, early Joe, Jersey sweet, Oldenburgh, Roxbury russet (very poor), Westfield seek-no-further, ladies' sweet, Esopus Spitzenburgh, Porter, Lowell, lady apple, Newtown pippin, English russet, Northern spy, red Canada, Rhode Island greening, Peck's pleasant.

From the preceding lists it will be seen that the following have proved hardy wherever tried, without exception, viz.: sops-of-wine, late strawberry, white winter pearmain, wine-sap, fall orange, Fallawater, maiden's blush, Carolina June, and red Astrachan.

Pears.—B. W. STEERE, Adrian, Mich., gives the following list: *Tender*—Bartlett, Seckel, Winkfield, Oswego beurre. *Hardy*—Flemish beauty, Tyson, Rostiezer, Doyenné d'été, beurre d'Anjou, belle lucrative, Onondaga, and Lawrence.

The OHIO POMOLOGICAL SOCIETY, in its transactions for 1857, gives from the report of some of its members the following pears as having proved valuable at Cincinnati: Walker, Fontenay, Jalousie, Andrews, Gray Doyenné, Urbaniste, belle lucrative, Flemish beauty, Kirtland, Doyenné Sieulle.

I. C. ALLEN, of Lena, Stephenson Co., Ill., furnishes the following list of pears, the results of his experience in that region. *Very hardy*—Flemish beauty. *Hardy*—Stevens' Genesee, Susette de Bavay. *Half hardy*—Doyenné d'été, white Doyenné, Easter beurré, Glout Morceau, Bilboa, Henry IV., Seckel, Tyson, Bergamotte Cadette, Aremberg. *Tender*—Bartlett, belle lucrative, beurre d'Anjou, Beurre Bosc, Catillac, Chaumontelle, Dearborn's seedling, Angoulême, Louise Bonne of Jersey, Madeleine, Vicar of Wakefield, Van Mons' Leon le Clerc.

Cherries.—The dukes and Morello cherries, such as early Richmond, Maydnke, belle magnifique, belle de Choisy, Morello, etc., all succeed well at the West, while the heart and bigarreau varieties generally fail.

Small Fruits.—Currants, Houghton's gooseberry, and the smaller fruits generally, succeed well throughout the West.

THE FLOWER-GARDEN.

FOR WHOM PREPARED.—What we shall say of the selection and culture of flowering plants and shrubs, will be adapted to beginners, rather than amateurs, to the open ground—not the green-house—for there are ten thousand gardens, where flowers may and should be cultivated, to one green-house; and there are ten thousand who need the elements of the art to one who would be benefited by its higher instructions. The work, therefore, will be practical rather than scientific, plain, rather than classical.

BEST KIND OF SOIL.—For a flower-garden, a light, mellow soil is by far the most preferable; the mould of the beds and borders should be sifted, and raked nearly level, or with a gradual slope. The most modern flower-gardens are those which are made out of a lawn, or grass-plot; but where this is not already in existence, turf may be laid, after the beds are formed. It is essential that the lawn or grass-walks should be frequently trimmed, and more frequently rolled, to prevent the grass from running to seed, and overrunning the flower-beds, and to keep down the worms, and give it a neat, regular, carpet-like appearance. The beds intended for the more tender flowers, should be protected from the cold, cutting winds, by hedges or plantations of shrubs, and the whole intersected, here and there, with winding gravel walks. The practice formerly adopted, of dividing the flower-garden into a number of small beds, and surrounding each with a path or gravel-walk, is now laid aside by those whose taste is considered the most correct; or, at least, is confined to very small plots of ground.

A flower-garden should be so situated, as to form an ornamental appendage to the house; and, where circumstances will admit, placed before windows exposed to a southern or south eastern aspect. The principle on which it is laid out, ought to be that of exhibiting a variety of color and form so blended as to present one beautiful whole. In a small flower-garden, viewed from the windows of a house, this effect is best produced by borders laid sideways to each other, and to the windows from which they are seen; as by that position the colors show themselves in one mass; whereas, if placed endways to the windows of the house, they divide the whole in appearance, and occasion a scarcity of show.

Without great neatness in the treatment of the spot devoted to flowers, much of the pleasing effect which otherwise would be produced on the mind is counteracted. Neatness consists in something more than the mere weeding and raking of beds and borders, hoeing and sweeping of alleys. It is perceptible even in the mode of tying up, trimming and training plants—even in the style of suspending a collar or label round the neck of a carnation.

A little attention to these matters, at the beginning, induces a habit of doing even the minutest things in the flower-garden with good taste, and of avoiding any arrangement that may be unsightly.

THE SHRUBBERY.—Shrubs follow so closely in order after flowers, that we cannot refuse their assimilation in our pages; indeed, so many of them are embellished with flowers, and many of them, too, at a season when our flowers have lost their loveliest charms, that they have a double claim on our regard; some of them are also so hardy, as to brave our severest winters, and bloom even amid our more chilling days. Summer's loveliest gem—the virgin rose—belongs also to this tribe of plants; the myrtle, with its delicate petals; the clematis, with its climbing tendrils and odoriferous sweets; the lilac, with its ornamental coronals, and numerous other favorites of Flora, exhibit claims to our admiration.

The distinction, therefore, between flowers and shrubs is merely that the former are of the herbaceous kind, that is, their stalks are generally soft and succulent, and require, comparatively, but little watering, themselves imbibing a considerable share of moisture from the atmosphere; while the latter are harder and firmer in the stalks, approaching nearer to the nature of trees, except in having shorter stems and more bushy heads.

Shrubs are all perennials, and are divided into two kinds, deciduous and evergreens; the former lose their leaves in the winter, and do not regain them till the following spring; the latter only shed them when new leaves are ready to appear.

Deciduous shrubs are divided into flowering and ornamental kinds. They grow from one to ten or twelve feet high; and some sorts, in favorable situations, attain a much greater height: the creeper kinds, if properly trained, will reach to fifty or even a hundred feet. They may be raised from seeds, sown in the spring months, and planted out in the autumn; and propagated by suckers, cuttings, or layers. They require mostly a good rich loamy soil; and many of the flowering and more tender kinds should be protected in a greenhouse from the inclemency of the wintry season.

The evergreen kinds of shrubs are also divided into flowering and ornamental; and are, like the deciduous, raised principally from seed, and propagated by slips, cuttings, suckers, and layers. They attain a similar height: and the parasitical kinds, as they are termed from living principally on the nourishment they derive from clinging to trees, as the ivy tribe, grow as high as the creepers among the deciduous shrubs. They will thrive in almost any kind of soil, and being particularly hardy, vegetate amid the severity of winter as in the genial warmth of summer; but the American evergreens, of which we have now many elegant flowering varieties, thrive only in peat or boggy earth.

When shrubs are planted for hedges, they, in their first growth, should be timely trimmed and trained, and kept free from weeds, the sides cut even, and the tops sparingly touched, till nearly at the required height, except that the weak and runaway tops should be nearly leveled with the rest, that the whole may advance with regularity.

The beds and borders of a flower-garden should, in no part of them, be broader than the cultivator can reach to from each side, without treading on the beds; the shape and number of them must be determined by the size of the grounds and taste of the person laying out the garden; only, as a sort of general rule, do not allow less than three times as much grass-plot as flower-bed, exclusive of the gravel-walks, which ought not to be very numerous.

Although the grandest display is produced by a general flower-garden, that is, by cultivating such a variety of sorts in one bed or border, as may nearly insure a constant blooming; yet bulbous plants, while essential to the perfection of the flower-garden, lose much of their peculiar beauty, when not cultivated by themselves. The extensive variety of bulbous roots furnish means for the formation of a garden, the beauty of which, arising from an intermixture of every variety of form and color, would well repay the trouble of cultivation; particularly as, by a judicious selection and management, a succession of bloom may be realized throughout the summer months.

As, however, bulbous flowers lose their richest tints about the time that annuals begin to display their beauties, there can be no well-founded objection why the latter may not be transplanted into the bulbous beds, so that the opening blossoms of the annuals may fill the place of those just withered, and continue to supply the flower-beds with all their gaiety and splendor.

THE CLASSES OF FLOWERS AND SHRUBS.—Flowers are divided into *annuals*, *biennials*, *perennials*, *bulbous*, *tuberous*, and *herbaceous*.

Annuals are plants that live only one summer.

Biennials are plants that do not produce their flowers until the second year, and then die after they have ripened their seeds. Some, however, are included in this class that live three or four years, as the hollyhocks, snap-dragons, Canterbury bells, etc.

Perennial Plants are those permanent plants which are not woody, but which generally die down to the ground every year and spring up again the year following. There are some, however, which are called evergreen perennials, which never die down to the ground, such as pinks, carnations, several kinds of saxifrage, etc. Perennials have the great advantage over annuals and biennials, that they do not require renewal from seed, but are propagated by division of the root or division of the plant.

Bulbous Plants are perennials, and they are propagated by separating the offsets, which may be considered as a kind of division of the root. Bulbs enjoy the advantage of being more independent of a fixed residence in the soil than many other plants. During their period of rest, they may be kept out of the ground, be made the subject of merchandise, and be transported to very considerable distances. Meanwhile their vitality is still in full force, and important changes, such as the formation of the future blossom, is going on within them. In due time, they again require the nutriment supplied by the rains and the earth; just as an animal that has lain torpid all winter, seeks his food on awakening in the spring. The capability of propagation by offsets is another point of interest belonging to bulbs. Young progeny, exactly resembling the parent plant, are thus produced with certainty. Bulbs often are the subjects of the first attempts at horticulture by juvenile gardeners; and are occasionally the only means by which city residents can gratify their taste for growing flowers. By far the great majority of bulbs produce exceedingly handsome blossoms, often odoriferous and even highly scented.

Tuberous-rooted Plants.—Tuberous-rooted plants are propagated by separating the tubers; and when these tubers are furnished with eyes like the potato, they may be cut into pieces, preserving an eye to each;

but when they are without eyes or buds excepting at their upper extremity, as in the case of the dahlia and the garden ranunculus, each tuber must be separated from the parent plant entire with its bud. A perfect bulb has a single leading germ; a tuber has several.

Herbaceous Plants.—The great majority of plants which ornament the miscellaneous borders of a flower-garden are herbaceous perennials, including under this term bulbs and tubers.

Plants are called herbaceous when, although their existence may endure for a term of years, the stems which support their leaves and flowers, instead of mounting permanently like those of shrubs and trees, die down to the root, or to the tuft of leaves which crowns the root, every winter, to send up fresh stems (if they are not stemless, as is the case with many herbaceous plants) the following spring.

HARDY ANNUALS.—Fall Sowing.—Hardy annuals may be sown in September, and, if lightly covered with litter, the plants will survive the winter. Transplanted in early spring, they come early into bloom.

The following may be thus sown: sweet alyssum, coreopsis, or calliopsis, China aster in varieties, catch-fly, chrysanthemum in varieties, evening primrose, larkspur in varieties, pansy, or heart's-ease, poppy in varieties, rocket larkspur.

How to Sow.—When the seeds of annuals are sown, the ground should first be made firm by pressing it with the saucer of a flower-pot, or the back of the spade; the seeds should then be sprinkled thinly over the ground, and just covered with fine earth, which should be slightly pressed down over them. When they come up, if they appear too thick, they should be thinned out so as to leave each plant standing apart; the distance at which they are left from each other varying, of course, according to the strength and habit of growth of the plant.

Snails and slugs are dangerous enemies to young and tender annuals, and care should be taken to search for them early in the morning and late in the evening; or to destroy them by watering the ground with lime-water, so weak as not to disfigure the plants.

Cultivation.—So much has been heretofore said in this work on cultivation in general, and on the saving and planting of seeds, that we need not here repeat what we have before said, as the principles applicable to planting in general apply equally to flowering plants and shrubs. Nor shall we give the lists of flowers—legion in number—which fill our floral books, and which confuse and distract the unpracticed cultivator. We choose rather to present a choice and select list of hardy plants and shrubs—such a list as will neatly and elegantly adorn the homes either of the opulent or the humble, and continue in bloom from May to November. This list will be made up from the works of Delamar, Cobbett, Loudon, Bridgeman, and others; and instead of following the classes or divisions of plants as named heretofore, we prefer, for convenience of reference, to arrange it in alphabetic order.

SELECT LIST OF FLOWERING PLANTS AND SHRUBS.

Adlumia.—A graceful climber. If the seeds are sown in the common border, near a trellis or arbor, in May, the plants will flower finely, without any further care the following season.

Anemone.—This is a very beautiful flower, and worthy of great pains. It is raised from seed, or from pieces of the roots. Sow the seed in spring. The plant does not blow the first year. The root, which is tuberous, is taken up in the fall, dried in the sun, and put by in the dry till spring, when it is put into the ground again. And, during the summer, it sends out young roots, which must be taken off and planted out to become flowers. There is a great variety of colors and of sizes of this flower.

Adonis.—Herbaceous plants with showy flowers, natives of Europe, of easy culture in any common soil. The most ornamental species are *A. vernalis*, the spring-flowering Adonis, a perennial with bright yellow flowers, which is quite hardy, and is easily increased by division of the root; and *A. autumnalis*, the common annual *flos Adonis*, or pheasant's eye, with dark crimson flowers. All the species will grow in any common garden soil; and the annual kinds should be sown in autumn, as they will stand the winter in the open air—or early in spring, as they are a long time before they come up. The seeds will keep good several years.

Althea Frutex.—It is raised from seed, or from suckers. There are several sorts, as to colors. They should be mixed to make a variety. Save the seed in November or December. The pods are full. Sow in the spring. Seed produces the handsomest shrub; and it is to be got almost anywhere.

Auricula.—This plant may be raised from seed, but the flowers in such cases are generally unlike their originals. The auricula is also propagated by division of the root, or by cutting off slips which have generally some roots attached, and are put at once into small pots. The season for performing the operation is shortly after the flowers have gone off, or, if they are left on, immediately after the seed has ripened.

Arbutus.—A pretty evergreen, well known and easily obtainable.

Aster, China.—An annual, bears great quantities of seeds and is sown early in the spring. There is a great variety of colors, and profusion of blossoms. It yields no odor, but a clump of it is very beautiful.

Azalia.—That little American honey-suckle that impedes our steps when shooting on the skirts of woods. It however, blows profusely, though it has no smell like the English honey-suckle.

Balsam is an annual and a most beautiful plant, with great abundance of flowers. Sow when you sow melons, at a distance of four feet; leave only one plant in a place; let the ground be rich and kept clean; it will blow early in July, and will keep growing and blowing till the frost comes, and then, like the cucumber, it is instantly cut down. I have seen balsams in Pennsylvania three feet high, with side-branches two feet long, and with a stem much bigger than my wrist, loaded with beautiful blossoms. Plant, branch, leaf, flower; all are most elegantly formed, and the colors of the flowers extraordinarily vivid and various. There are, however, some more double than others, and some variegated. The seed of these should be sowed, and it comes in great abundance. The flower of the balsam has no smell.

Briar, Sweet.—A well known shrub of the rose kind. Rows of it carefully planted and pruned make very good hedges, and it will grow in almost any ground, though fastest in good ground.

Boronia.—*Rutaceæ.*—Evergreen New Holland shrubs, which flower during the greater part of the summer, and which are all very ornamental. *B. serrulata* is a most desirable species, forming a neat compact plant for a room, or green-house, and requiring plenty of light and air, but very little heat. It, and all the other species, will grow freely in sandy peat, well drained, and they may be propagated by layers or cuttings of the young wood in sand, under a bell-glass, taking care to wipe the glass frequently, so as to keep the cuttings free from damp.

Bell-Flower, Hare-Bell.—The Canterbury bell, *C. medium*, is the Virgin's violet, or *Viola Mariana* of the sixteenth century, whence it has been falsely styled the marine violet. A large genus, not nice about soil, of easy culture and propagation, and valuable as affording abundance of blue flowers. Perhaps the most remarkable, *C. pyramidalis*, sends up a flower-stem six feet high or more, covered with blue blossoms from top to bottom. Many of the hardy perennials are dwarf plants, which produce a profusion of flowers, more conspicuous than the leaves. Some of the prettiest little species for pots, or rockwork, are *C. cenisia*, and *C. uniflora*, which do not exceed three inches in height, and are covered during June or July with blue flowers; *C. carpathica*, *C. rotundifolia*, *C. garganica*, and upwards of fifty others, which do not exceed six inches in height. All these are very valuable for forming beds in a geometric or regularly-shaped flower-garden, from their dwarf and compact habit of growth, and from the great profusion of their leaves and brilliant-looking flowers. *C. medium*, the Canterbury bell, is one of the most ornamental of biennials; and *C. speculum*, Venus's looking-glass, is a well-known and pretty annual.

Basella.—*Chenopodieæ.*—*B. tubcrosa*, the Madeira vine, is a beautiful climbing plant recently introduced, which, from the elegance of its glossy foliage, and its numerous fragrant white flowers, has already become quite a favorite. It grows with the greatest ease in any soil, but in a rich loam, it will grow forty feet in a single season—and is therefore an admirable plant for covering an arbor or screen where immediate effect is desired. The roots are tuberous, with numerous eyes or buds somewhat resembling the potato, and may be kept through the winter in a warm cellar in the same manner.

Clematis.—*Ranunculaceæ.*—Half-hardy and hardy climbers; shrubby and herbaceous; with white and purple flowers. They are all most desirable plants, of the easiest culture in any light rich soil; and readily propagated by cuttings of the young wood, or seeds, which are frequently ripened plentifully. *C. florida*, with white flowers; *sieboldtii* or *bi color*, with white and purple flowers, and *C. azurea* or *cærulea*, with beautiful violet blue flowers, are among the handsomest of conservatory climbers; and under glass, they frequently come into blossom early in March. In the open air, they do not flower till May or June. *C. azurea* is as hardy as the common wild kinds; but the others are sometimes killed to the ground by frost. *C. viticella*, and its varieties, *C. flammula*, *C. Hendersonii*, and *C. cylindrica*, are all quite hardy, and form most beautiful objects when trained over lattice-work, or baskets in the flower-garden; and no garden, however small, ought to be without one or more of these species.

Carnation.—Here are beauty and fragrance, and both in the highest degree. There are various sorts, distinguished, like those of the auricula, by names; and what is said of the seed of the auricula applies here. If sown, the carnation does not blow till the second year. It is usually propagated by layers. While it is blowing, it sends out several side-shoots near the ground. These are pinned down in August to the earth with a little stick with a hook at the end of it. A little cut, or tongue, is made on the under side of the shoot; and thus the head of the shoot is brought upright. The part that touches the ground is well covered with earth; and roots come out here before the fall. Then the stalk, which connects the young plant with the old one, is cut off; the young plant is transplanted, and the next year it blows. The old root does not stand another year well; and therefore its branches are thus made use of to keep up the race and the sort. Carnations are rather tender as to frost. They must be well covered in this country to live through the winter. It is best to put them in large pots to give room for laying, and to keep them in a green-house in winter, or in some house where they can have sun and air. However, they merit all the pains that can be bestowed upon them.

Clove is only a more handy and less esteemed sort of carnation, which see. It may be propagated like the carnation, or by cuttings, which is the easier way. Instead of laying down the side shoots, you cut them off. Then you cut away the hard part of the shoot, strip off three or four of the bottom leaves. Tip the rest of the leaves; make a little split in the butt of the shoot, and then, with a little smooth pointed stick, plant the cutting in the ground. This is to be done early in August. The young cloves will have roots in the fall; and you may transplant them into the open ground or into pots to blow the next year. The old clove-plant will, however, blow for many years. I should think that, with good covering, such as directed for spinach, cloves would live out the winter in this country.

Columbine.—A perennial. Very common, but very pretty.

Cowslip.—This is one of the four flowers without which English pastoral poetry would be destitute of that which awakens the most delightful ideas. The cowslip, the primrose, the violet, and the daisy, are of endless recurrence in that species of writing. They all come early in the spring; and are all beautiful. Neither of them is seen here, and they all might; for they will bear any severity of weather. The cowslip is of the *Polyanthus* tribe. It is of a delicate yellow color, and sends forth many blossoms from the same stem, which rises about six inches from the ground. It may easily be propagated from seed, which it bears in great abundance; but, when you once have a plant, the easiest way is to propagate from offsets. The plants raised from seed do not blow till the second year.

Catalpa.—Has fine leaves and splendid flowers. It will grow in any common soil that is tolerably dry; but if it has too much moisture, the shoots, which are naturally soft, with a large pith, will never be thoroughly ripened. For the same reason, the situation ought to be airy. It is propagated by seeds or cuttings of the roots.

Crocus.—The welcome harbinger of returning sunshine and cheerfulness; although one species, *C. sativus*, or saffron, flowers in the autumn, and is cultivated for culinary and medicinal purposes rather than as a garden plant. The genus is large; a few species only are desirable for the parterre, the Alpine crocuses having mostly insignificant flowers, although interesting in other respects. The yellow crocus, *C. luteus*, is a general favorite; but requires a bright sunny day for its perfect expansion. The cloth-of-gold, *C. Susianus*, which has been put forward to rival it, is far inferior.

In whatever way the crocus may be planted, the leaves should never be cut off till they begin to wither, as, without their assistance, the plant cannot accumulate matter to form its new bulb for the ensuing season. The new bulb always forms above the old one; so that in four or five years they will have almost pushed themselves out of the ground; and from this habit of growth, crocuses are generally planted three or four inches deep.

Cercis.—*The Judas tree.*—Few trees are more ornamental in a shrubbery than the two species of this genus; but *Cercis Siliquastrum*, the common kind, is decidedly the handsomest. The leaves are curiously shaped, and the flowers, which are of a beautiful pink, grow out of the bark of the stem and branches, and not, like those of other plants, among the leaves. These flowers have an agreeably acid taste, and, when fried in batter, make excellent fritters. The common Judas-tree is a native of the Levant, and it is frequently grown against a wall, producing its flowers in April; but the American kind, *C. canadensis*, is quite hardy. They both produce abundance of seeds, and grow best in a deep sandy loam, rather rich than poor.

Clintonia.—*Lobeliaceæ.*—Beautiful little annuals, flowering profusely the whole summer. They are natives of California, but will bear heat better than the generality of annuals from that country. They are generally raised on a hotbed (the seeds being sown in February), and planted out in May; but they may be sown in the open border in June.

Club-Moss.—A curious kind of moss, common in Europe and America, some of the kinds of which are very ornamental. *L. helveticum*, which is very handsome, is generally grown in pots in greenhouses. It should be grown in peat and loam, and allowed abundance of water.

Daisy.—The most beautiful varieties are the large double, the large quilled, and the hen-and-chickens; but there are many others. In Germany numerous curious varieties have been raised by saving the seed of the handsomest kinds. Each sort is much improved by being taken up, divided, and replanted three or four times every season. They are all admirable plants for making edgings to borders, and they are well suited for growing in pots, though at present they are almost neglected. They thrive best in a loamy soil, richly-manured, which should be dug over and well broken before planting; and they will bear transplanting even when in flower, provided they are taken up with a portion of soil attached. No plants are better adapted for covering a bed with one mass of color. Masses of any of the kinds of daisies may be brought from the reserve ground and laid down on a bed in the flower-garden when just coming into flower, and taken back again to make room for other plants, when they have gone out of flower.

Day Lily.—Handsome perennial plants, with yellow or copper-colored flowers. They are quite hardy, and only require a moist soil and a shady situation. They are propagated by dividing the roots.

The Furze.—An erect evergreen shrub, with yellow flowers, which are produced nearly all the year. The common kind, in favorable situations, will grow ten feet high.

Geum.—*Rosaceæ*—.*Avens or Herb Bennet.*—Perennial plants, natives of Europe and America, with very handsome flowers. *G. Quellyon,* Swt. (*G. coccineum,* Bot. Reg.), is a splendid plant, a native of Chili, with large, orange-scarlet flowers. All the species are hardy, and require a light, rich soil; they are propagated by seeds, or by dividing the roots. Some of the species are now called Sieversia; the seed-vessels of Geum being hooked, and those of Sieversia ending in a straight, feathery point.

The Geranium wants hardiness only to make it the finest flower-plant of which I have any knowledge. Some give us flower with little or no leaf; others have beauty of leaf as well as of flower, but give us no fragrance; others, like the rose, give us this added to beauty of flower and of leaf, but give us them only for a part of the year. But the geranium has beautiful leaf, beautiful flower, fragrant smell from leaf as well as from flower, and these it has in never-ceasing abundance; and as to variety of sorts, as well in leaf as in flower, it surpasses even the flower of the auricula. How delightful the country where geraniums form the underwood and the myrtles tower above! Softly, my friends. Beneath that underwood lurk the poisonous lizards and serpents, and through those myrtle-boughs the deadly winged-adders rustle; while all around is dry and burning sand. The geranium is a native of the south of Africa; and though it will not receive its death-blow from even a sharpish frost, it will not endure the winter even in the mild climate of England. But then it is so easy of cultivation, it grows so fast, blows so soon, and is so little troublesome, that it seems to argue an insensibility to the charms of nature not to have geraniums if we have the means of obtaining earth and sun. The geranium is propagated from seed or from cuttings. The seed, like that of the auricula, does not produce flower or leaf like the mother plant, except by chance. It is easily saved, and for curiosity's sake may be sown to see if a new variety will come. But a cutting from any part of the plant, old wood or young wood, stuck into the ground, or into a pot, will grow and become a plant, and will blow in a month from the time you put it into the ground. You must have plants, indeed, to cut from, but these may be, in small number at any rate, in a window during winter. When the spring comes cut them up into cuttings, put these in the ground where you wish to have plants during the summer. They will be in bloom by July, and before October will be large as a currant-tree. Take off cuttings from these during September, put them in pots, and they are ready for the next spring. If you have a green-house you have geraniums in full bloom all the long dreary winter.

Guelder-Rose.—This is called here the snowball-tree. It is raised either from layers or suckers. Its bloom is of short duration; but, for the time, makes a grand show in a shrubbery. The suckers of it ought to be dug clean away every year.

Heart's-Ease, or Pansy.—A beautiful little annual, which has great varieties, and all of them pretty. It blows all the summer. It may be sown in the fall without any care about covering the ground; but it must not come up in this country till spring.

Hollyhock.—This is a fine showy plant for a shrubbery. There are double and single, and none but the double should be cultivated. It may be raised from seed or from offsets. If the former it does not blow till the second year. It will remain in the ground many years, and is perfectly hardy.

Chinese Hollyhock.—This is a more tender and far more beautiful kind than the common. It is raised from seed only; blows the second year, and only that year. It is, therefore, a biennial.

Honeysuckle.—This, amongst all English shrubs, is the only rival of the rose; and, if put to the vote, perhaps as many persons would decide for the one as for the other. Its name indicates its sweetness of taste, and the smell is delightful almost beyond comparison. The plant is also beautiful; it climbs up houses and over hedges; it forms arbors and bowers; and has a long-continued succession of blossoms. It grows wild in all parts of England, in many parts covering the hedges and climbing up the trees. There is little variety as to sorts. That which is cultivated has a larger and deeper-colored bloom, but the wild has the sweetest smell. It may be propagated from seed, but always is from cuttings; put into the ground in the spring, and treated like other wood-cuttings. Among the most valuable are the monthly fragrant, the red and the yellow trumpet, and the Chinese twining, *L. flexuosa.* The latter, in addition to the beauty and fragrance of its blossoms, which are produced several times during the summer and autumn, is also highly desirable for the rich, dark hue of its nearly evergreen foliage, and the circumstance of its not being liable to the attacks of insects, which destroy the beauty of some of the other species.

Hazel.—*Corylus Avellana.*—The common hazel is rather a fruit-tree than an ornamental shrub; but it is sometimes grown in pleasure-grounds and geometric gardens to form a shady walk. They require no particular care but planting the young trees in a loamy soil, giving them, if possible, a little of that rich yellow soil generally called hazel loam, from its peculiar adaptation to this plant, and clipping and training the branches so as to make the walk form one continued bower.

Honesty.—Hardy annual and perennial plants, which will grow in any common garden soil, and only require the usual treatment of annuals and perennials.

Hyacinth.—This is a bulbous-rooted plant, and, like all the plants of that class, is perennial. It may be raised from seed; but, as in the case of the auricula and many other plants, it is many chances to one, that out of a whole bed you do not get a good flower, and perhaps it is a hundred to one that you do not get a flower to resemble the mother plant. Therefore none but curious florists attempt to raise from seed.

The roots are propagated from offsets; that is to say the mother root, while it is blowing, sends out on its sides several young ones. The old root, young ones and all, are put away in a dry place out of the reach of severe frost till spring. Then when you plant the old one out to blow again, you take off the young ones and plant them also. They do not blow the first year, and, if weak, not the second. But in time they do, and then they produce offsets. This is the way the hyacinth is multiplied. It is a fine and fragrant flower; it blows early, and will blow well even in glasses in a room, but better in earth. A fine flower for a green-house, where it would be out in full bloom while the snow was on the ground.

Jasmin has the merit of a very delightful smell, and that only. Its leaf and flower are insignificant. It climbs, however, and is good to cover bowers. It well deserves a place against the wall of a house or the piers of a veranda, which it will cover in a very short time; or if planted against trellis-work, or against the frame-work of a bower, it will soon afford an agreeable shade, and produce its long, graceful, deep green shoots in such quantities as, after covering the bower, to hang down to the ground all round it, and require to be separated like a curtain by a person entering. This plant and the common ivy, when trained up a single post, with a spreading umbrella top of framework, form some of the finest objects in small gardens by their pendent branches, which not only hang down from a height of from fifteen feet or twenty feet to the ground, but trail along it to a considerable distance.

Jonquil.—An elegant and sweet-smelling bulbous-rooted plant. Propagated and cultivated in all respects like the hyacinth, which see.

Kalmia.—An evergreen shrub of great beauty, and of several varieties, great quantities of which are seen in most of the rocky woodlands of this country.

Kill-Calf.—It is a dwarf shrub, and may be raised from seed or from suckers. It is very pretty. When in bloom it resembles a large clump of sweet-Williams. It is so pretty that it is worth having in the green-house, where it would blow probably in April in Long Island.

Laburnum.—This is a tall and beautiful shrub, loaded when in bloom with yellow blossoms, in chains; whence it is sometimes called the golden chain. It is raised from the seed as easily as Indian corn.

Larkspur.—An annual of no smell, but of great variety as to colors, and when in a clump or bed presenting a great mass of bloom. There is a dwarf and a tall sort. The dwarf is the best. There is a branching kind which is good for nothing.

Lilac.—Desirable for its great masses of fine large bunches of bloom. There is the white, the blue, and the reddish. It is propagated from suckers, of which it sends out too many, and from which it should be kept as clear as possible. It is an ugly shrub when out of bloom. The leaves soon become brown; therefore there should be but few lilacs in a shrubbery.

Lily of the Valley.—This is the only lily that I should like to have. It is a pretty little dwarf plant that thrives best in the shade, where it produces beautiful blossoms of exquisite sweetness. It is a bulbous root, and propagated from offsets.

Loose Strife.—Herbaceous plants with yellow flowers, chiefly perennials, and of which one species, *L. nummularia*, money-wort, is a well-known evergreen trailer, which, when kept in a pot of moist soil, will produce shoots of two or three feet in length, which hang down on every side. *L. verticillatum* is an upright-growing plant, with abundance of showy, yellow flowers, which looks very well as a border-flower in a large garden. They will grow in any common garden soil.

Lupin.—A species of pea or tare, and frequently cultivated in the fields, and eaten in soup and otherwise by the Italians, and in the South of France. It grows, however, upon a stiff stem, and is upright, and branches out, like a tree in miniature. There is a great variety of sorts as to color of flower as well as to size of plant. The yellow dwarf is the best, and it smells very sweet. It is an annual.

Magnolia.—One of the finest of the laurel tribe. It can be raised from seed, or from layers. A very fine shrub indeed. There are several varieties of it. It will thrive in a loamy soil, rather rich; but it will grow still better in peat, and it requires no attention but training the branches, and nailing them against the wall. It produces its large flowers, which are from six inches to a foot in diameter when fully expanded, from August to October. *M. g. præcox* is a comparatively rare variety, with broader leaves than *M. g. exoniensis*, and still larger flowers, and they appear in July and sometimes in June. In purchasing both species in the nurseries, care should be taken to select plants which have been raised from layers; as seedlings, which are now sometimes imported from France, are often ten or fifteen years before they come into flower; whereas the others will flower the first or second year.

Mountain Ash.—*Pyrus aucuparia.*—A well-known tree, very ornamental in shrubberies for the abundance of red berries with which it is covered every autumn. It is quite hardy, and will grow in any soil and situation.

Mignonette.—An annual that bears abundance of seed. The plant and the flowers do not surpass those of the most contemptible weed; but the flower has a very sweet smell. It may, if you have a greenhouse, be had at any time of the year. The plants may stand at four or five inches asunder; but, if they stand thicker, the bloom is inferior, and does not last so long.

Morning Star.—This is a fine shrub. It can be raised from seed, or from layers.

Myrtle.—The myrtle is a native of climates where it is never cold. It will not endure even November all out, in Long Island. To have it, therefore, it must be housed in winter. It may be raised from seed, cuttings, slips or layers. The leaf of the myrtle has a fine smell; and, when the tree is in bloom, it is pretty. But, it is a gloomy looking shrub. One geranium is worth a thousand myrtles. The broad-leaved myrtle is the best in every respect, and especially because it is easily brought to blow.

Narcissus.—A bulbous-rooted plant, managed precisely like the *hyacinth*, which see. It blows early, is very beautiful, and has a delightful smell. Nothing is easier than the propagation and management of flowers of this tribe, and few are more pleasing. The narcissus is a very nice thing for a parlor or a green-house.

Passion-Flower.—So called because the flower has a cross in the middle, and rays, resembling a glory, round the edges of it. It is a singularly beautiful flower. The plant is also beautiful. It is a climber, like the honeysuckle; and, like that, has a succession of blossoms that keep it in bloom a long while. It is raised from cuttings, which, treated as other cuttings are, easily take root.

Pœony.—A perennial that may be raised from seed or offsets. A grand flower for shrubberies. Each flower is usually as big as a teacup, and one plant will sometimes produce twenty or thirty.

Pea, Sweet.—There is a great variety in the annual sorts as to color of blossom, and, there is a perennial sort, called everlasting pea. This stands, of course, year after year. The others are sown and cultivated like the common garden pea. They should have some sticks to keep them up. This is a very showy flower, and remains in bloom a long while.

Pink.—This flower is too well known to need describing here. There is a great variety of sorts, as to the flower; but all are cultivated in the same way; exactly as directed for the clove, which see. The pink-root will last a great many years; but the flower is seldom so fine as the first year of the plant's blowing.

Polyanthus.—The polyanthus, the primrose, the oxlip, and the cowslip, are all species of the same genus. Every thing that has been said of the auricula (which see) may be said of the polyanthus. It is a very pretty flower, and universally esteemed. It blows finest out of the hot sun. Polyanthuses are best in beds; for a great part of their merit consists of the endless variety which they present to the eye. The polyanthus has a delicately sweet smell, like that of the cowslip.

Poppy.—A very bad smell, but still is to be sought for on account of its very great variety, in size, height, and in flower; and on account of the gayness of that flower. The seed-pods of some are of the bulk of a three-pound weight, while those of others are not so big as even a small pea. The smallest, however, contains about a thousand seeds, and these come up, and the plants flourish, with very little care. A pretty large bed, with two or three hundred sorts in it, is a spectacle hardly surpassed in beauty by any thing in the vegetable creation. It is an annual, of course. It is well known as a medicinal plant; but, it is not so well known as a plant from the seed of which salad-oil is sometimes made! The Germans, on the Rhine, cultivate whole fields of it for this purpose. It may be as well, therefore, for us to take care not to use German salad-oil, which, however, can with great difficulty be distinguished from oil of olives.

Primrose.—A beautiful little flower of a pale yellow and delicate smell. It comes very early in the spring; and continues a good while in bloom. Of the fibrous rooted flowers it is the next to the daisy in point of earliness. It is a universal favorite; and, in England, it comes abundantly in woods, pastures and banks. It is perennial like the cowslip, and is propagated in the same manner. The primrose is very ornamental as a border flower, but it has not sported so much as the polyanthus, and there are therefore no florists' primroses. The border or garden varieties, however, which are mostly double, are very showy; among these the double flesh-colored, double white, double brimstone, double red, double copper, double dark purple and double violet, deserve a place in every garden. The single white and the single red, both of which are found wild, are also much admired, and are valuable as coming into bloom in March.

Petunia.—*Solanaceæ.*—Perhaps no plants have made a greater revolution in floriculture than the Petunias. Only a few years ago they were comparatively unknown, and now there is not a garden, or even a window, that can boast of flowers at all, without one. They may be sown in the open ground as soon as the seed is ripe, or early in spring, or suffered to sow themselves; care being taken in all cases in the open air to choose a sheltered situation, and to lay a few dead leaves over the bed if the weather should be severe.

Ranunculus.—It is a flower of the nature of the anemone, which see. It is propagated and cultivated in the same manner. These two flowers are usually planted out in beds, and make a very fine show.

Rhododendron.—It never occurred, perhaps, to any American to give this fine name to the laurel with a long narrow leaf and great bunches of blue, pink or white flowers, the balls or pods containing which appear the year before the flower. It is however a beautiful shrub.

The Double Ragged-Robin.—*L. floscuculi* (cuckoo-flower,) is of graceful habit, with delicate pink flowers, grows in any moist loam, and increases freely at the root. *L. chalcedonica*, when single, offers the form of a Maltese cross, in white, pink, scarlet, and saffron-yellow. The double scarlet variety is a brilliant flower, thriving best in light rich loam. There are double garden varieties of *L. viscaria*, *dioica*, and *sylvestris*. *L. alpina* makes a pretty decoration to the rock-work, with the help of a few handfuls of fresh heath-mould.

The Rose.—Of all the flowers none are more beautiful than roses; and none better reward the care of the cultivator. Roses are natives of Europe, Asia, Africa and America, but none have yet been found in Australia. The number of roses is almost incredible, above a hundred distinct species have been described, and there are above two thousand named varieties to be procured in the nurseries. The best known and most common kind of rose is the cabbage or Provence rose (*rosa centifolia.*) This species is a native of Eastern Caucasus, whence it was brought at a very early period. There are more than a hundred varieties of it; all very beautiful and very fragrant. The moss roses are all varieties of the cabbage. All the cabbage roses may be grafted standard high on briers of the common dog rose; and they all require a richly manured soil, and an open situation. The French or Provins rose (*rosa gallica*) is a compact erect-growing plant with large open flat flowers borne on stiff erect flower-stalks; thus forming as strong a contrast as possible to the cabbage rose.

Damask Roses—*R. damascena*—are of rough, twiggy, thorny habit, with light-green, somewhat downy leaves, and hardy constitution. A good example is the true York and Lancaster, a double flattish, striped rose, which occasionally produces blooms wholly white on one half of their area, and wholly red on the other, thus symbolizing the union of the houses after the bloody wars of the White and Red Roses. They are fragrant flowers, but the bushes on their own roots are of irregular, scrubby, and inelegant growth. Budded as standards, they may be treated in the same way as the French roses. Show damasks, which deserve mention, are Madame Hardy, pure white, but with a green eye too conspicuous; Semiramis, fawn in the center, shaded with glossy pink; *la féroce* or ferox, very large, full, pink flowers, with an extra allowance of thorns on the branches; *la Constance*, or pœony-flowered, very large, flattish, full, pink, darker in the center, makes a showy standard; *la Ville de Bruxelles*, pink, very large and double; *la chérie*, delicate blush, cupped, very double; Madame Zoutman, delicate cream-color; and *pulcherie*, pure white. Do not prune these in too closely; let them run on, to form large heads, unless they are getting shabby and naked near the original bud.

Running Roses.—Of climbing roses, useful for pillars, temples, verandas, and running over the front of a cottage, there are several groups. The Boursault roses, *R. Alpina*, the Alpine or thornless roses, are very distinct. They are perfectly hardy, of exuberant growth if well fed, and afford a good foundation on which to bud other varieties, either as standards or trained against a wall. The crimson Boursault, or Amadis, has an abundance and a long succession of semi-double effective flowers, and makes a gay covering for an arbor or a rustic arch. The blush Boursault, or Calypso, or *de l'Isle*, or Florida, or the white Boursault, is still more rampant. Its perfect bloom is extremely beautiful, very double, of delicate texture, deep blush in the center, shaded to white outside; but the majority of flowers produced are imperfect and misshapen, as if some one had burst by a kick of the foot a cambric handkerchief rolled tight into a ball. These are the two leading types; other Boursaults are Drummond's thornless, elegans, gracilis and inermis, all of them different shades of rosy crimson and cherry-color. As standards they make enormous heads, which become pendent and weeping if allowed to run on.

The Ayrshire Roses—*R. arvensis*—are nearly as vigorous as the preceding, quite as hardy, and will serve the same purpose. They are mostly shades of blush and white. *Rosa ruga*, or the double Ayrshire, the Queen of the Belgians, the Dundee rambler, and splendens, are the best of these, and very elegant they are in their peculiar style.

The Evergreen Roses—*R. sempervirens*—are named according to what we would wish them to be, rather than to what they are. They have smooth, shining, handsome foliage, which looks as if it ought to be as evergreen as a laurel-leaf; and the habit of their growth gives you the idea that they certainly might flower all the autumn through. But they don't. The best of them is *félicité perpétuelle*, an elegant climber, with clusters of small, very double, pinky white blossoms. *Donna Maria* is very pure white, as if the petals were made of rice-paper with graceful foliage, but more tender than the above. Grown as weeping standards, they should be suffered to make a cataract of drooping branches without restraint. *Adelaide d'Orleans* is not very, if at all, distinct from félicité. *Brunonii* has the merit of being rosy-crimson.

Beware how you prune any of the above.—They may be made to climb up trees like the honeysuckle.

Of the Prairie Rose or Bramble-Leaved Rose—*R. rubifolia*—from North America, the best perhaps is the queen of the prairies; but florists apologize for them, by stating that "the group is in its infancy."

The Banksian Roses—*R. Banksiæ*—from China, white and yellow varieties, are half-hardy climbers, which must have plenty of space to ramble over, and a sheltered situation. If kept in bounds with the knife, they will only make the more wood and won't flower. Dead wood and irregular shoots must be rectified with finger and thumb. In all the Banksias, the blossoms are very small, in clusters, and very fragrant. Were they hardy, they might be budded on the tallest procurable stocks, to make trees of the magnitude of the weeping-ash. For instance, at Toulon, there is a white Banksia which, in 1842, covèred a wall seventy-five feet broad and eighteen feet high; when in ful flower, from April to May, there were not less than from 50,000 to 60,000 flowers on it. At Caserta, near Naples, there is another plant of the same variety, which has climbed to the top of a poplar-tree sixty feet high. And at Goodrent, near Reading, there is a yellow Banksia which, in 1847, produced above two thousand trusses of flowers, with from six to nine expanded roses on each truss.

The Many-flowered Roses—*R. multiflora*—from Japan and China, are very pleasing climbers, with numerous clusters of small flowers, of shades often changing and fading in the same cluster, from full pink to white. Unfortunately their hardihood is not to be depended on, and they can only be trusted as conservatory plants here, or to be budded and grown as standards in large pots. Beautiful varieties are Grevillei or the seven sisters, Laure Devoust, rubra, elegans, and alba, which will make a grateful return for whatever protection it may be thought fit to bestow upon them.

All roses to do themselves justice must have a rich soil; many are even gross feeders. The hardier and more robust kinds do well in deep alluvial loams, and will not object to heavy clayey land if well manured, and not too wet and cold. The Chinas, and many of the hybrids, when on their own roots, must have a lighter, warmer, better-drained soil, with a considerable proportion of sand and rotten animal and vegetable remains. In theory, all roses may be propagated by cuttings; in practice, non-professional gardeners find certain kinds, such as the mosses, the Provence, and the cabbage-yellow, of a difficulty which approaches the impossible. Many hybrids, the Bourbons, the Chinas, the noisettes, and others, strike readily, especially if assisted by a hand-light and bottom-heat. Species like the cabbage-yellow, which will neither bud nor strike well, must be increased by layers, the shoot being "tongued."

The Siberian Crab.—This shrub is by some esteemed for its fruit, of which they make a conserve—more, I imagine, to gratify the sight than to gratify the palate. But, as a tall shrub, it yields, for the time, to very few. There is the red-blossomed and the white-blossomed. The branches of both, when in bloom, present ropes of flowers, while the trunk, the limbs, the branches, and the leaves, are all delicate in form and in hue.

Snow-Drop.—Is the earliest of all flowers. In England it blows in January. Once in the ground, it is not very easy to get it out again. Nothing but carrying it away, or actually consuming it with fire, will rid you of it. No sun, not even an American sun, will kill a snow-drop bulb, if it touch the ground.

Stock.—There are annuals and biennials of this name; and, if I were to choose amongst all the annuals and biennials, I should certainly choose the stock. Elegant leaf, elegant plant; beautiful, showy and most fragrant flower; and, with suitable attention, blooms even in the natural ground, from May to November in England, and from June to November here. The annuals are called ten-week stocks. And of these there are, with a pea-green leaf, the red, white, purple and scarlet; and then there are all the same colors with a wall-flower or sea-green leaf. So that there are eight sorts of the annual stock. Of the biennials, there are the Brompton, of which there are the scarlet and the white; the Dutch, which is red; the queen's, of which there are the red and the white; and the Twickenham, which is purple. As to propagation, it is, of course, by seed only. If there be nothing but the natural ground to rely on, the sowing must be early; the earth very fine and very rich. The seed is small and thin, and does not easily come up in coarse earth.

If the plants come up thick, thin them, when very young. And do not leave them nearer together than six inches. They, however, transplant very well; and those that have not place to blow in may be removed, and a succession of bloom is thus secured. If you have a green-house, glass-frame, or hand-glass, you get flowers six weeks earlier. The biennials are sown at the same time, and treated in the same way. They blow the second year; but, if there be great difficulty in preserving them, in the natural ground, through the winter in England, what must it be here! Indeed, it cannot be done; and yet they are so fine, so lofty, such masses of beautiful and fragrant flowers, and they continue so long in bloom, that they are worth any care and any trouble. There is but one way; the plants, when they get ten or a dozen leaves, must be put into flower-pots. These may be sunk in the earth, in the open ground, till November [Long Island], and when the sharp frosts come, the pots must be taken up, and placed out of the reach of hard frost, and where there is, however, sun and air. When the spring comes, the pots may be put out into the natural ground again; or, which is better, the balls of earth may be put into a hole made for the purpose; and thus the plants will be in the natural ground to blow. In this country they should be placed in the shade when put out again; for a very hot sun is apt to tarnish the bloom.

Syringa, or Mock-Orange.—A very stout shrub, with blossoms much like that of the orange, and with a powerful smell. It is propagated from suckers, of which it sends out a great many.

Sweet-William.—A very pretty flower. Makes a fine show. Comes double by chance; and is very handsome whether double or single. It is propagated from seed, the plants coming from which do not blow till the second year. The sweet-William root does not last many years. It may be propagated by parting the roots; and this must be done, to have the same flower again to a certainty, because the seed do not, except by chance, produce flowers like those of the mother plant.

Tuberose.—This is a bulbous-rooted plant that sends up a beautiful and most fragrant flower. But, even in England, it cannot be brought to perfection without artificial heat in the spring. If got forward in a green-house, or hot-bed, and put out about the middle of June, it wou... blow beautifully in America. It is a native of Italy, and the roots are brought to England, and sold there in the shops. It is propagated and managed precisely like the hyacinth, which see.

Tulip.—Beds of tulips vie with those of carnations and auriculas. They are made "shows" of in England, and a single root is sometimes sold for two or three hundred guineas. And, why not; as well as make shows of pictures and sell them for large sums? There is an endless variety in the colors of the tulip. The bulbs, to have the flowers fine, must be treated like those of the hyacinth. The tulip may be raised from seed; but it is, as in the case of the hyacinth, a thousand to one against getting from seed a flower like that of the mother plant.

Violet.—This is one of the four favorites of the spring in England. It is a little creeping plant, that comes on banks under the shelter of warm hedges. The flower is so well known to excel in sweetness, that "as sweet as a violet" is a phrase as common as any in the English language. There is a purple and a white. Abundance of seed is borne annually by both; and the plant is perennial. If you propagate from seed, the flower does not come till the second year; but one plant, taken from an old root, will fill a rod of ground in a few years. There is a little plant in the woods of Long Island, with a flower precisely like that of the purple violet; but the leaf is a narrow oblong, instead of being, as the English is, in the shape of a heart; the plant does not creep; and the flower has no smell.

Wall-Flower.—It is so called, because it will grow, sow itself, and furnish bloom in this way, by a succession of plants, forever, upon old walls, where it makes a beautiful show. It bears abundance of seed, plants from which produce flowers the second year. Some come double sometimes. If you wish to be sure of double flowers, you must propagate by slips of double-flowering plants. There are the yellow and the mixed, partly yellow and partly red. All have a delightful smell, blow early, and are generally great favorites. I am afraid this plant, even with covering, will not stand the winter out of doors in America, unless in the south front of a building, and covered too in severe weather; for, even in England, it is sometimes killed by the frosts.

The following condensed list of flowering plants and shrubs copied from "The Garden," will be found valuable and reliable:

HARDY ANNUALS.

1. Blue Flowered Argeratum (*Argeratum Mexicanum*).—Color, blue; height, one foot; in bloom all the season.
2. Sweet Alyssum (*A calycina*).—White; fragrant; six inches; all season.
3. Love Lies Bleeding (*Amaranthus candatus*).—Red and yellow; summer.

4. Prince's Feather (*A. hypochondriacus*).—Red; summer.

5. Three-colored Amaranth (*A. tricolor*).—Is most beautiful on rather poor soil; summer.

6. Pheasant's Eye (*Adonis miniata*).—Red; showy; summer.

7. China Aster (*A. chinensis*).—Various colors; some lately imported varieties are very beautiful; eighteen inches; summer.

8. Cockscomb (*Celosia cristata*).—Crimson; eighteen inches; autumn.

9. Sweet Sultan (*Centaurea* of species).—(*C. moschata*,) purple; (*C. cretica*,) white; (*C. suaveolens*,) yellow; two feet; summer.

10. Morning Glory (*Convolvulus major*).—Various; climbing; summer and autumn.

11. Dwarf Morning Glory (*C. minor*).—Blue; eighteen inches; summer.

12. Chryseis (*C. crocea*).—Orange; one foot; all the season; (*C. Californica*) yellow.

13. Lupine (*Lupinus* of species).—Many varieties; various; one to five feet; some are perennial.

14. Cypress Vine (*Ipomœa* of species).—(*I. quamoclit*,) crimson; (*I. alba*,) white; climbing; summer and autumn. (*I coccinea*,) a native Southern plant; is generally classed with the morning glories; red; climbing; autumn.

15. Phlox (*P. Drummondii*).—Crimson; rose, lilac, and white; (*P. Van Houtii*,) variegated; two feet; all the season.

16. Zinnia (*Z. elegans*).—Varions; two feet; very showy; should be watered copiously; all the season.

17. Balsam, or Ladies' Slipper (*Balsamina hortensis*).—Various; two feet; summer and autumn.

18. Mignonette (*Reseda odorata*).—Yellowish green: six inches; chiefly valued for its perfume; all the season.

19. Nasturtium (*Tropæolum atrosonquineum*).—Crimson; climbing; in bloom all the season.

20. Canary Bird Flower (*T. aduncum*).—A beautiful climber.

21. Portulacca (*P. splendens*).—Purple; splendid; (*P. Thorburnii*,) yellow; (*P. alba*,) white; (*P. elegans*,) crimson; (*P. Thellusonii*,) red; should be grown in a mass to give the finest effect.

22. Malope (*M. grandiflora*).—Scarlet and white; three feet; summer.

23. Ten-week-stock (*Mathiola annua*).—At least a dozen distinct colors; one foot; summer. All the varieties are well worthy of cultivation.

24. Marigold (*Tagetes erecta*).—Orange, yellow, straw-colored; eighteen inches; autumn. French Marigold (*T. patula*,) striped with deep brown purple, and yellow.

25. Clarkia (*C. elegans*).—Rose-colored; elegant; (*C. Pulchella*,) purple, showy; (*C. alba*,) white; one foot; all the season.

26. Candytuft (*Iberis amara*).—White; (*I. umbellata*,) purple; (*I. violacea*,) violet; (*I. odorata*,) sweet-scented. All these species are desirable.

27. Larkspur (*Delphinum ajases*).—Many varieties, double-flowered,

and superb. Branching Larkspur (*D. consolida*,) various colors; summer.

28. Three-colored Gilia (*G. tricolor*).—Light-blue margin with dark center; dwarf; summer.

29. Poppy (*Papaver Marseillii*).—White, edged with red; eighteen inches; summer.

30. Sweet Pea (*Lathyrus odoratus*).—Many varieties—white, black, scarlet, and variegated; three or four feet; summer and autumn.

31. Hibiscus (*H. manihot*).—Yellow; (*H. Africanus major*,) buff, with a black center; two feet; summer.

32. Clintonia (*C. elegans*).—Blue; six inches; very slender; autumn.

33. Verbena (*V.* of species).—Every shade of color from white to crimson; procumbent; very pretty; all the season.

34. Dwarf Sunflower (*Helianthus Californicus*).—A double flower.

35. Sun Love (*Heliophila araboides*).—Bluff; very pretty.

36. Pansy (*Viola tricolor*).—Various; all the season. [A perennial, but treated as an annual.]

37. Petunia (*P. violacea*).—Every variety of color; dwarf; all the season.

38. Yellow Everlasting (*Xerantheum* of species).—Eighteen inches.

39. Evening Primrose (*Œnothera macrocarpa*).—Yellow; large flowered; dwarf; summer and autumn.

40. Loasa (*L. lateritia*).—Orange-colored; a beautiful climbing plant.

41. Calandrinia (*C. discolor*).—Rosy purple; very fine; summer and autumn.

42. Calliopsis (*C. bicolor*).—Three feet, very showy; autumn.

43. Marvel of Peru (*Mirabilis Jalapa*).—Many varieties; autumn.

44. Grove Love (*Nemophila maculata*).—Spotted; beautiful.

45. Heliotrope (*Tournefortia heliotropoides*).—White and blue; very fragrant; autumn.

46. Love-in-a-Mist (*Nigella Damacene*).—Showy; autumn.

For twelve sorts, the following would be a good selection: Numbers 1, 2, 7, 9, 10, 14, 15, 21, 23, 25, 33, and 37. To make up twenty sorts, add 6, 11, 13, 16, 19, 22, 29, and 41.

HARDY BIENNIALS.

1. Rose Campion (*Ayrostemma coronaria*).—Blooms all summer.

2. Foxglove (*Digitalis* of species).—Purple, white, and spotted.

3. Canterbury Bell (*Campanula* of species).—Varions; blooms in July and August.

4. Hollyhock (*Althea rosa*).—All its varieties; summer and autumn. Desirable varieties can be propagated by dividing the roots. Biennial-perennial.

5. Gerardia (*G.* of species).—Yellow, purple, and spotted

6. Dwarf Evening Primrose *Œnothera corymbosa*).

7. Humea (*H. elegans*).—All the season.

8. Catch Fly (*Silene multiflora*).

9. Musk-scented Scabious (*Scabiosa atropurpurea*).

10. Naked-stemmed Poppy (*Papaver nudi aule*).

Though all the biennials are generally propagated by seeds, the donble ones may also be successfully continued by cuttings and slips of the tops, and by layers and pipings. Biennials, it should be remembered, never flower till the second year.

HARDY PERENNIALS.

1. *Herbaceous Plants.*

1. Columbine (*Aquilegia vulgaris*).—Single and double, many colors.

2. Harebell (*Campanula* of species).—All the species of this genus are very beautiful. Flowers single and double; many colors. *C. grandiflora* has superb blue flowers.

3. Carnation (*Dianthus caryophyllus*).—A much noted and very beautiful flower; propagated by seeds and by layers.

4. Sweet William (*D. barbatus*).—Many colors and shades of color—white, red, pink, and crimson. The French call it *boquet parfait.*

5. Pink (*D. plumarius*).—Many varieties.

6. Chrysanthemum (*Pyrethrum* of species).—Varieties and colors numberless; the last showy flower of the season. The following are all very beautiful:

LARGE-FLOWERED.	SMALL-FLOWERED.
Defiance—lemon-yellow.	La Fiancée—white.
Baron de Solomon—rosy-crimson.	Harriette Lebois—rosy-carmine.
Julia Langdale—rosy-purple.	Cybelle—amber and gold.
Liencour—lilac and orange.	Mignonette—rose.
Magnificent—blush.	Vartigene—crimson.
Mrs. Cope—crimson-purple.	Paquerette—white-shaded crimson.
Sphinx—bright claret.	Sacramento—dark yellow, red center.
White Perfection—pnre white.	Louise—pale rose.

7. Double Daisy (*Bellis perennis*).—Many varieties, and various shades of white, pink, and crimson.

8. Dielytra (*D. spectabilis*).—A very beautiful plant; flowers pink and white; June and July.

9. Foxglove (*Digitalis* of species).—Various and beautiful. Theoretically a biennial; but may be continued by dividing into offsets.

10. Gentian (*Gentiana* of species).—Blue, yellow, and white; very showy.

11. Geraninm (*Pelargonium* of species).—Species numerous; varieties numberless. For bedding-plants the scarlet, the nutmeg-scented (white). and the rose are the most desirable.

12. Forget-me-Not (*Myosotis sylvatica*).—Blue, pretty, and indispensable.

13. Hollyhock (*Althea rosa*).—We have mentioned this among the biennials, where it theoretically belongs; but it is practically a perennial from the way in which it increases by cuts. Hollyhocks are very beautiful in their proper places—in borders and among shrubbery. The varieties and colors are numberless. Choose the double-flowering sorts.

14. Lupine (*Lupinus* of species).—Some of the perennial herbaceous sorts are very beautiful; early in summer.

15. Double Ragged Robin (*Lychnis* of Species).—Scarlet and white

16. Pansy, or Heartsease (*Viola tricolor*).—Varieties innumerable; sometimes treated as an annual; blooms all the season.

17. Violet (*Viola* of species).—Many of the species, both native and foreign, deserve a place in the garden. Of *V. odorata plena*, the white and purple varieties are very beautiful. Bloom early.

18. Phlox (*P.* of species).—Various colors; no garden should be without some of the perennial species; summer.

19. Veronica (*V. chamædrys*).—Blue flowers; a good border plant; early in summer.

20. Valerian (*V. hortensis et V. Pyrenaica*).—White and red; grow and bloom well on walls and rockwork.

Nearly all the foregoing plants are easily propagated by dividing the roots, and will grow in any garden soil. A few of them will not prove hardy north of New York.

2. *Tuberous-rooted Plants.*

1. Dahlia (*D. variabilis.*)—Colors and varieties numberless; a splendid autumn flower for large beds and among shrubbery. The following are a few of the finest varieties:

Amazone—yellow, margined with carmine.
Anna Maria—violet, tipped with white.
Belle Amazone—bright yellow, edged with gold.
Favorite—dark carmine.
Gazelle—delicate blush.
Grand Sultan—dark purple, with light edges.
Imperatrice Eugenie—black brown.
Madame Becker—maroon, tipped with white.
Malvina—purple, shaded with darker purple.
Renuncale Imperiale—lilac and purple.
Pretrose—dark carmine.
Wonderful—dark yellow, with purple stripes.

2. Iris (*I.* of species).—More than fifty species, some of which are tuberous-rooted; all very beautiful. *I. susiana* is the finest; flowers large and spotted with brown.

3. Marvel of Peru (*Mirabilis Jalapa*).—Generally treated as an annual; very beautiful; requires a warm border.

4. Everlasting Pea (*Lathyrus* of species).—The common everlasting pea is *L. latifolius*. Once planted, it will, for the most part, take care of itself. Some of the species are annuals.

5. Peony (*P. officinalis*).—Many varieties. The Chinese peony (*P. fragrans*) has pinky-purple flowers, and a rose-like perfume.

6. Ranunculus (*R.* of species).—Several species are hardy and desirable for border-plants. The double buttercup (*R. acris*) is well known.

7. Ladies' slipper (*Cypripedium* of species).—Several species are natives of our woods; very beautiful, but difficult of propagation.

8. Anemone (*A.* of species).—Many species; white, purple, yellow, and scarlet; succeed best in cool latitudes. Our native wood anemone (*A. nemorosa*) deserves mention among the garden flowers.

The tuberous-rooted plants are propagated by tubers, and some of them also by seeds. Dahlias require a sandy soil. Sand and vegetable mould make a good mixture for them. No animal manure should be applied.

3. *Bulbous-rooted Plants.*

1. Crocus (*C.* of species).—Many species; yellow, lilac, white, etc. The yellow crocus (*C. luteus*) is the greatest favorite. The spring-flowering (*C. vernus*) works in well among shrubs and trees; blooms early in the spring.

2. Crown imperial (*Fritillaria imperialis*).—Color varies from light yellow to orange red; showy; suitable for borders.

3. Hyacinth (*Hyacinthus Orientalis*).—Varieties innumerable; choose an assortment of various colors.

4. Iris (*I.* of species).—Of the bulbous species, the Persian (*I. Persica*) is the most beautiful, but does better in a pot or frame, with some protection.

5. Lily (*Lilium* of species).—The species are very numerous, and all very beautiful. The following is a selection:

Common white (*L. candidum*).
Double white (*L. candidum flore pleno*).
Scarlet (*L. chalcedonicum*).
Japan (*L. lancifolium* of var.)—white, red, rose, spotted; very beautiful.
Turk's cap (*L. martajon*).—various.
Tiger (*L. tigrinum*).

6. Narcissus (*N. tazetta*).—Yellow and white variously combined varieties numerous.

7. Daffodil (*N. pseudo narcissus*).—Many varieties.

8. Jonquil (*N. jonquilla*).—Bright yellow; fragrant; requires copious watering.

9. Snowdrop (*Galanthus nivalis*).—Double and single; both desirable.

10. Squill (*Scilla* of species).—Blue and white; *S. amœna* and *S. Siberica* are exceedingly brilliant and beautiful; blossom early in spring.

11. Star of Bethlehem (*Ornithogalum* of species).—White and variegated; easy of cultivation.

12. Tulip (*Tulipa Gesneriana*).—Varieties innumerable and of every shade. There are early and late sorts. Choose some of both.

FLOWERING SHRUBS.

1. Rose (*Rosa* of species).—Multitudinous in species, and countless in variety. No two persons would make the same selection. For the few sorts wanted in a common garden, we suggest the following:

HYBRID PERPETUAL ROSES.

Augusta Mie—blush.
Geant des Battailles—brilliant crimson.
Caroline de Sansal—flesh-color.
Lord Raglan—fiery crimson.
Matharin Regina—lilac.
General Jaqueminot—crimson-scarlet.
Mrs. Elliott—rosy-purple.
Duchess d'Orleans—rosy-carmn
Baron Hallez—light crimson.
Sydonie—light pink.
Baron Prevost—deep rose.

La Reine—deep rosy lilac.
Louis Peronny—deep rose, shaded.

PERPETUAL MOSS ROSES.

Madam Edward Ory—rosy carmine.
Marie de Burgoyne—clear red.
Salet—bright rosy red.
General Drouot—purplish crimson.
Perpetual White—pure white.

SUMMER ROSES.

Coupe de Hebe—brilliant pink.
Paul Ricaut—rosy crimson.
Perle de Panche—white and red
Persian Yellow—deep golden yellow.
Madame Plantier—pure white.

CLIMBING ROSES.

Queen of the Prairies—red, striped with white.
Baltimore Belle—blush, nearly white.
Mrs. Hovey—pale blush.
Perpetual Pink—purple pink.

2. Rhododendron (*R. Catawbiense*).—This splendid American flowering shrub is worthy of a place in every garden.

3. Azelia (*A. vicosa et A. nudiflora*).—White and purple; fragrant, too much neglected.

4. Flowering Almond (*Amygdalus nana*).—Beautiful pink flowers. Very desirable in every garden. Spring.

5. Magnolia (*M. abovata*).

6. Tree Peony (*P. Moutan*).

7. Japan Quince (*Pyrus Japonica* of var.).—Scarlet and white; very early in the spring.

8. Japan Globe Flower (*Kerrier Japonica*).—Double yellow flowers. Showy. Spring.

9. Spiræa (*S.* of species).—Many very beautiful species. The lance-leaved spiræa (*S. lanceolata*) is the most beautiful of all. Flowers, white; blooms in May. Very desirable indeed.

10. Deutzia (*D. gracilis et D. scabra*).—Flowers white. *D. Scabra* is the more hardy. Both should be cultivated where the climate will permit.

11. Guelder Rose or Snowball Tree (*Vibromum opulus*).

12. Garden Hydrangea (*H. Hortensia*).—White flowers.

13. Lilac (*Syringia* of species).—Some of the new varieties are fine.

14. Pomegranate (*Granatum flore pleno*).—Beautiful; should be a favorite wherever the climate is sufficiently mild.

15. Sweet-scented Shrub (*Calycanthus Floridus*).

16. Althea or Rose of Sharon (*Hibiscus Syricus*).—Many varieties.

17. Honeysuckle (*Lonicera* of species).—Beautiful shrubs.

18. Pink Mezereum (*Daphne mezereum*).—Dwarf, pretty; flowers in March.

19. Rose Acacia (*Robina hispida*).

20. Mock-orange (*Philadelphus coronarus*).—White, fragrant. May and June.

21. Forsythia (*F. vividissima*).—A magnificent new shrub from China. Flowers bright yellow; very early in spring.

22. Crimson Currant (*Ribes sanguineum*).—Single and double crimson; early in spring.

23. Ashberry (*Mahonia aquifolia*).—Evergreen; bright yellow flowers; blossoms very early in spring.

24. Rose-colored Wiegela (*W. rosea*).—Delicate rose-colored blossoms.

25. Silver Bell (*Halesia* of species).—*H. diptera* is much finer than the common silver bell (*H. tetraptera*).

CLIMBERS AND CREEPERS.

1. Virginia Creeper (*Ampelopsis hederacea*).
2. Trumpet Flower (*Tecoma radicans**).
3. Clematis (*C.* of species).—Several species; white, blue, and purple. The sweet-scented (*C. flamula*) is exceedingly fragrant.
4. Ivy (*Hedera* of species).
5. Honeysuckle (*Lonicera* of species).—The sweet-scented is one of the most desirable species; in bloom through the summer; very fragrant. The Chinese evergreen (*H. sinensis*) is also a very fine sort.
6. Chinese Wistaria (*W. sinensis*).—A very beautiful climbing plant, having blue flowers in clusters.
7. Climbing Rose (*Rosa* of species).—For these, see preceding list.
8. Jasmine (*Jasminum revolutum*).—Bright golden flowers; very fragrant; Southern. Deserves a place in every garden at the South.
9. Passion Flower (*Passiflora* of species).—The most beautiful one is the purple flowering (*P. incarnata*).
10. Birthwort or Dutchman's Pipe (*Aristolochia sipho*).—An excellent arbor vine.

CHIMNEY AND OTHER APARTMENT PLANTS IN WINTER.—The enjoyment which a real lover of flowers derives from watching the development of flowering plants within doors in winter is in some respects even more intense than that which is afforded him in summer, when flowers abound all around him.

The contrast between the verdure and perfume within, and the barrenness and bleakness without, is no doubt the chief cause of the especial pleasure with which the winter bloom, even if only of a few ordinary plants, on a chimney-piece or table, is contemplated.

Happily some flowers may be made to bloom in the humblest cottage, even in mid-winter, without trouble, or even cost worth calculating.

Hyacinths, narcissuses, and jonquils require but a little water at our hands, and standing-room over the mantlepiece; why refuse such moderate demands?

Let us follow the directions of a French gentleman,† who has furnished some hints worth attending to, respecting the winter management of hyacinths and other bulbs wanted for an apartment in a private house.

About the middle of October put, suppose, hyacinth-bulbs in the usual white bottle-vases, made and formed for such purpose.

Fill these vases with water, but not so high as to allow more of the bulb to touch the water than the fleshy knob at the base, from which the roots will issue. As there will be a regular waste of water caused

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* Gray; the *Bignonia* of the old botanists.

† M. Ysabeau's "Connaissances Utiles."

by evaporation and the absorbing power of the growing plant, there will be occasion for a constant supply of water to replace what has been evaporated, or consumed by the plant.

In a short time the fibrous roots come forth and plunge into the water, and at last fill the space within the glass, while the flower-stem and the leaves are growing without. Various bulbs may be forced in vases or glasses of the same kind, proving how the course of nature may be altered in the vegetation of plants by the exercise of human ingenuity.

One of the established laws respecting the growth of plants is, that, lay the seeds, bulbs or, tubers, from which they spring, as you will (in the earth or in water), the stem grows upward and the roots downward.

Yet by the following process, the hyacinth-bulbs can be forced to grow in the contrary position; that is, with their stems turned downward and their roots upward, which would appear, unless explained, as unnatural as it would be for a man to rest always on the crown of his head with his feet directly upward.

But the hyacinth can be brought to assume this position without difficulty, thus:

Fill with good mould, a little square tin box (with a lid and hinges), with a round hole in the middle, through which the stem of a bulb put into the mould within the box, can come forth in the natural way, just as if it were placed in a pot.

Then lay the box upside-down, over a glass filled with water. In this position now, the roots of the bulb must strike out sideways in the box above, while the head of the bulb projecting downward into the water, must send its stem in the same direction along the narrow glass, which will not permit it to turn sideways. The bottom of the box, now uppermost, has holes in it, through which water and air are supplied to the roots, which extend themselves one very side.

In the course of a few days the leaves and stem will be seen to grow in the water as they would have done in the air, if their position were reversed and they had not been forced to go downward.

This is a whimsical but interesting mode of growing bulbous plants; it is really curious, however, to see leaves and natural colors of flowers exactly the same in the water as they would be in the air.

Many bulbous plants may be ranged on a chimney or on a stand, in a warm room (but this ought never to be in a sleeping-room, as the odors in a close apartment are very prejudicial to human health), with very pleasing effect.

Orange and violet-colored crocuses, Chinese primroses, and double violets, in neat garden-pots, filled with earth, will be welcome occupants of any space among other plants of more pretension, and they will bloom perfectly well in an inhabited room. In short, if there be room enough, many plants, but, above all, the beautiful camellia, and even the humble Chinese primrose, will be ornamental in the gloomy months of early spring.

But let not mignonette be forgotten. This may be converted into a shrubby-plant by treating it in this manner:

In the autumn, put a strong plant, twelve inches in height, which had grown in the open ground, into a pot; take away all the stems except one, which you are to tie with rushes or bass-mat, all along its length, to a firm stake; head down the stem to within six inches of the surface of the earth in the pot. Several new shoots will push forth, and from these you are to choose five or six, to be left as nearly as possible at equal distances from each other, to form a base for the head.

These shoots will soon lengthen and flower; they should not, however, be allowed to ripen their seeds; therefore they are to be trimmed so as to leave but a single shoot to each tuft to replace those that are removed, which in its turn is to undergo similar treatment. Thus, by continually arresting the tendency to produce seed, and to produce useless and weakening stems, the principal one, and also the base of the flowering stalks, which are continually renewing themselves, are rendered woody.

In Belgium and Holland, where this mode of treating mignonette is common, large shrubs of it may be seen blooming ten or twelve years, and constantly during summer flowering in the balconies of the houses, and in winter in the apartments within.

Violets, too, receive similar treatment, and with equally good results.

THE DAHLIA.—This superb flower, which is so hardy and easily cultivated by any one who has a few yards of garden, deserves a special notice, and not only because it is one of the greatest ornaments in the garden during the autumn, but from the fact that most persons who see and admire it neither know from what part of the world it has been brought into our country, nor by whom, nor when.

M. Ysabeau, from whom I have derived most of this information, informs us that the Dahlia was discovered in 1800, by the distinguished Russian traveler and philosopher, Baron de Humboldt, who found it in its wild state in the high mountain valleys of Mexico.

The beautiful varieties we possess are proofs of what the art of man is permitted to accomplish in improving the qualities of the wild plants which the Creator has strewn in our paths. In its native state, it is a lowly plant, producing a very simple, unshowy flower.

The discoverer imagined that the tubers which he sent to Europe would prove, like those of the potato, good food for man and beast. Yet, had he tasted them, he must have found them to be exceedingly bitter and nauseous, besides being medicinally violent in effect.

The name, which ought properly to be that of Humboldt, became that of Dahlia, in compliment to the Swedish botanist, Dahl.

For some time the Dahlia, condemned as a worthless esculent, was unknown as an ornamental flower, but when its beauties became developed by the gardener's skill in crossing the seeds, and every year it expanded into finer varieties, it became a prized flower. Shadings of color, from white to the deepest purple, have been obtained in surprising extent, and the form of the flower has been rendered perfect. One color, however, is still wanted: a perfect blue Dahlia has not, I believe, yet appeared.

The Dahlia is propagated by the tubers, with a small piece of the stem adhering to each; and to have them growing freely in the open garden immediately after the spring frosts (which would destroy the flower-buds), the usual way is to put them under a hot-bed frame until the shoots strike out from the tubers; thus advanced in their growth, they should be put toward the end of May into strong rich loam, deeply and well pulverized. The herbaceous stem soon lengthens, and requires a strong and high iron stake or frame to support it.

The first winter white-frosts destroy the beauty and vegetation of the plant, which should be cut down without delay. The tubers are then to be dried in the open air a few days before they are put by into a garret or dry store-room of any kind.

The multiplication of the Dahlia by tubers is the most common and convenient mode of culture. But grafting on the tubers is also employed.

To effect this, a young shoot of the variety which is to be propagated, is prepared at its lower extremity with the knife, in the usual wedge manner, and inserted into a slit opened on one side of the tuber. This is then put under glass into earth deep enough to cover the grafting-point, and left there until the parts have united and the scion has pushed out new leaves. The hand-glass over it should then be gradually removed.

New sorts can also be grafted on the stem of a Dahlia in full growth, just under the axil of a leaf, tying tne bud and shoot to the stem with a bit of woolen thread.

By grafting thus in July, flowers of different colors may be produced in the following autumn on the same stock.

Dahlias are also raised from cuttings, stuck under glass, in June and July.

But a great number of varieties are obtained by impregnation of the species, of which the crossings may be without end.

By this mode the most brilliant and beautiful varieties may be gained amidst a multitude of very inferior sorts. All is uncertainty in this respect, but by the other modes any particular kinds can be multiplied every season.

GUANO, AS A MANURE.—ITS COMPONENT PARTS, AND IMPORTANT USES IN THE GARDEN.

Guano, now estimated as one of the most highly-fertilizing manures, appears to have been long known among the Peruvians, by whom it has been used for ages. It is the excrementitious deposit of the numberless sea-birds with which the islands from which it is procured abound, and on which rain or humidity are equally unknown. By chemical analysis, it is found to contain about one fourth part of uric acid in combination with ammonia; it is also found to contain oxalic acid in combination with ammonia and potassa, and phosphates of ammonia, of lime, and of potassa.

Guano, thus rich in ammoniacal salts, acts particularly favorably on vegetation. By abstracting the carbonic acid from the atmosphere, it is the means by which the primary principles, as starch, mucus, etc., are formed, of which the body of the plant is constituted.

Plants manured with guano usually present a dewy appearance on their leaves early in the morning. The guano absorbs the vapor from the surrounding air, and this is especially fertilizing to plants, particularly in dry sultry weather.

Compared with other excrementitious manures, guano is found to be by far the most preferable. It is about four times better than night-soil, and more fertilizing, in the proportion of nearly three to one, than even dove-cote manure. It is, however, but fair to add that its effects upon the soil are not so lasting as are those of the stable manure, although far more prolific for a time.

Considerable quantities of this manure are found in the islands of the Pacific ocean; vast deposits have also been discovered on the islands abounding on the western coast of Africa. That imported from the small island of Ichaboe, is the richest in quality, and most estimated from its being very soluble and most free from sand or other useless admixtures.

The first cargo of Peruvian guano for the use of the British farmer, was imported in 1840, and since that time the importation has rapidly increased; but the trade in guano, which has been opened to the south-west coast of Africa, bids fair to be augmented to a degree which baffles calculation. In the first five months of the year 1844, nearly 7,000 tons were imported into Liverpool alone.

When Captain Farr of Bristol, who brought to England the first cargo of guano from Ichaboe, arrived at that island, it was covered with penguins, gannets, and other wild sea-fowl, in numbers that defied computation. Not having had any experience of the ways of mankind, they at first offered resistance, rather than betrayed any fear at his approach; but finding his encroachments interfered with their habits, they soon deserted the island, and retired to other more secluded situations.

The history of guano furnishes a singular and interesting evidence of the retributive operation of nature; it is, in fact, a return to the land, in a concentrated form, of a portion of the phosphate of lime, and other salts, which, carried away by the drainage waters, become the food of the fishes, the insects, and the weeds of the ocean; these becoming, in their turn, the food of the sea-fowls, are by those birds deposited, in the shape of indigested excremental matter on the rocky islands of the Pacific ocean, forming thus a portion of the guano which is now fertilizing the soil of England, to enter into the composition of other vegetables, and other animal substances.

The principal consideration, in using this fertilizing manure, is to keep in mind its peculiar and powerful qualities. In this respect, its application, as a manure, may be assimilated to the manner in which salt is applied. Salt, if used in its raw state, or in too powerful a solution, destroys vegetation. Guano, in like manner, must never come in close contact with plants; for all seeds, in the process of germination, give off a greater or lesser quantity of carbonic acid, and this acid, having a strong affinity for the ammoniacal portion of the guano, attracts it so powerfully, as to interfere with, and even destroy vegetation.

For farm purposes, guano should be mixed with about four times its own bulk of finely-sifted mould, or charcoal ashes, but never with lime, nor used on land that has been lately limed, as lime rapidly expels the ammonia from the guano, and thus deprives it of its principal fertilizing quality.* For the kitchen-garden, the most simple and also economical mode of preparing the guano, is as follows: spread upon the surface of the ground, about three inches thick, one hundred pounds' weight of mould that has been sifted; sift upon this about half that quantity of guano, and upon this sift another hundred pounds' weight of mould. Protect the heap from the weather by matting, or by any other kind of covering, and leave it for three days, at the end of which well mix it, and sift it through a garden sieve. This quantity is sufficient for the eighth part of an acre. It is now ready for use, and may be put upon the ground in the proportion of half a pound of this compost to each square yard. Its application for vegetables causes an exceedingly abundant crop, particularly if used in cloudy weather, or just before rain sets in.

For the flower-garden, it is perhaps best applied in a liquid state. In sifting guano for the kitchen-garden, some portion, such as decomposed bones, beaks, or claws of birds, will not pass through the sieve; if these be steeped in water, in the proportion of four ounces to one gallon of water, a rich liquid manure will be produced. Or, if the guano itself be used, not more than from two to three ounces to each gallon of water should be taken. Potted flowers watered once a week with this solution will be much benefited.

Guano is also useful to fruit-trees, and may be applied by well digging in and about the roots five or six pints of earth and guano, prepared with sifting and mixing as previously directed. This quantity is for standard trees; about half that quantity will be amply sufficient for an espalier; and about one pint of the compost, well dug in and mixed with the earth about each currant, gooseberry, and raspberry bush, will be found highly beneficial.

In using it for potting, the compost must be well mixed with good earth, care having been taken to thoroughly powder all the lumps in the guano. If the plant be already potted, the guano compost may be carefully stirred with the earth in the pot to about the depth of one or two inches.

When guano has been used in the compost state, that is, well mixed with sifted earth, as above directed, its subsequent application in a liquid state should not be in a greater proportion than at the rate of half an ounce of guano to one gallon of water.

The experiments which have been made, with a view to ascertain the effects which result from using guano as a manure, both in the kitchen-garden and the flower-garden, lead to the conclusion that, in the kitchen-

* Lime or chalk is sometimes so mixed up in the soil, as to exhibit no indication of its being present. To ascertain the fact, mix about half a pint of the soil in about a pint of water that has been boiled and suffered to become cool. Add to this, three table-spoonfuls of sulphuric acid; if an effervescence takes place, something like that of soda-water, do not use guano to the soil, as chalk or lime is mixed with it.

garden, it may be generally and successfully used, if carefully applied after having been first well mixed with sifted earth, and not in too great a quantity. For potatoes, carrots, and onions, it is particularly good, and causes abundant crops, if used in about the proportion of one part of guano well mixed with nine parts of light soil, and half a spade ful of this compost spread upon a square foot of earth, and well watered immediately after. About two ounces of guano to the square yard, is the quantity we would recommend for small gardens.

The manner in which guano gives out its richness to plants, may be understood from Professor Cuthbert Johnson's description. He says—"Until a plant has its leaves expanded, it lives at the expense of the seed; but the moment it spreads its leaves, it lives at the expense of the air. All plants contain oxygen, hydrogen, nitrogen, and carbon, three of which are gaseous substances. When a plant begins to spread its leaves, it absorbs or sucks in carbon from the air, wherein it existed in a state of carbonic acid. Nitrogen, an important ingredient of plants, existed also in the atmosphere; but the plant had not the power to suck it in from the air for its nourishment. Ammonia and nitric acid were the only two forms in which plants would obtain nourishment from nitrogen. So long as it was unknown that plants required this substance, it was not thought necessary to supply it in the way of manure, nor to preserve it from being lost to the soil. No manure can be efficacious unless nitrogen be present in it; and if manure be treated so, by exposure to the air, or by other means, as to allow the ammonia to escape, it is injured to that extent.

Guano, to be effectual, should be used in wet weather, or upon a wet day, for the sooner it is washed into the earth, the better; on no account should it be used on a windy day. It kills slugs, grubs, animalculæ, etc., and goes far to prevent the attack of blight and fly.

In the flower-garden it may be advantageously used, but here its application must be even more carefully studied than in the kitchen-garden. Perhaps it is most safely used in a liquid state for most flowers growing in the beds. One pound of guano may be put into eight gallons of water and let stand for about four hours, when eight more gallons of water may be added. Stir this up for use, and it will be found a valuable liquid for pouring on land, especially for flowers.

As a general principle, it may be considered that guano may be applied to all hard-wooded and hard fiber-rooted plants, whether vegetables or flowers; thus it is very good applied to most shrubs, like the myrtle, fuschias, rhododendron, ribes sanguinea, rose-bushes, etc., but must be carefully and very sparingly used to all plants of a succulent kind, particularly such as the balsam, and the like. To geraniums, its use is of rather a doubtful character, unless used in the liquid state, and then it must be much diluted, say to the extent of twice the usual quantity of water.

With a variety of potted plants, such as fuschias, calceolores, roses, camellias, and the like, guano has been used with success; both flower and foliage have been much improved. Applied to potted plants, it should be used in the liquid state, about an ounce to a gallon of water, applied twice a week.

APPENDIX TO THE FARM.

DIFFERENT VARIETIES OF WOOD.—Oak.—Numerous species of the oak-tree are found in the United States. They are generally distinguished for great strength, but are coarse-grained, and prone to warp and crack under changes from moisture to dryness. The live-oak of the Southern States (*Quercus virens*) is prized in ship-building beyond any native timber. The white oak (*Quercus alba*) is employed for the keels, side-timbers, and planks of vessels, also for frames of houses, mills, and machinery requiring strength; for wagons, parts of carriages, plows, and other agricultural instruments. Large quantities are consumed for the staves and hoops of casks, for which they furnish one of the best materials. The bark of the black oak (*Quercus tinctoria*), furnishes the *quercitron* used by dyers; most of the species of oak are employed in tanning, and they all furnish a valuable fuel.

Hickory or Walnut.—The wood of the different species of native walnut, or hickory (*Juglans, or Carya*), is eminently distinguished for weight, tenacity, and strength. It has, however, important defects. It warps and shrinks greatly, decays rapidly when exposed to the weather, and is very liable to the attacks of worms; on these accounts, it is never used for house or ship building, but is employed chiefly for minor purposes, where strength is the chief requisite; as in the teeth of mill-wheels, screws of presses, hand-spikes, capstan-bars, bows, hoops, and handles of tools. As fuel, the hickory stands at the head of native trees, and commands a higher price than any other wood.

Ash.—The white ash (*Fraxinus Americana*) and some other species are of great use in the arts; ash-wood is strong, elastic, tough, and light, and splits with a straight grain. It is also durable, and permanent in its dimensions. It furnishes the common timber used in light carriages, for the shafts, frames, springs and part of the wheels; flat hoops, boxes, and the handles of many instruments are made of it. It is almost the only material of oars, blocks of pulleys, cleats, and similar naval implements, in places where it can be obtained.

Elm.—The common American elm (*Ulmus Americana*) is valued for the toughness of its wood, which does not readily split. On this account it is chiefly used for the naves, among us commonly called *hubs*, of carriage-wheels.

Locust.—The common locust (*Robinia pseudo-acacia*) is one of the hardest, strongest, and most valuable of native trees. The larger pieces of its timber are used in ship-building, and the smaller pieces are in great request to form the treenails* or pins which confine the planks to the timbers. This tree is liable in the Northern States to be perforated by an insect, so that it is often difficult to procure sound pieces of any considerable size. Locust-wood is exceedingly durable when exposed to the weather, and forms excellent fuel.

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* Commonly pronounced trunnels.

Wild Cherry-Tree.—The wood of this tree (*Prunus Virginiana*) is of a deep color, hard, durable, and, when properly seasoned, very permanent in its shape and dimensions. In the manufacture of cabinet-work, it is much used as a cheap substitute for mahogany. On the Western rivers it is sometimes used in ship-building.

Chestnut.—The American chestnut (*Castanea vesca, B.*) is a large tree of rapid growth. Its wood is coarse and porous, very liable to warp, and seldom introduced into buildings or furniture. It is chiefly used for fencing stuff, for which use it is fitted by its durability in the atmosphere. Chestnut is an unsafe fuel, in consequence of its tendency to snap and throw its coals to a distance.

Beech.—The wood of the red beech (*Fagus ferruginea*) is liable to decay when exposed to alternate moisture and dryness. It does not, however, readily warp, and being smooth-grained it is used for some minor purposes, such as the making of planes, lasts, and card-backs. It forms a very good fuel.

Bass-wood.—The American bass-wood or linden-tree (*Tilia Americana*) produces a fine-grained wood, which is very white, soft, light, and flexible. It is sometimes employed for furniture, but its chief use is to form the pannels of chaise and coach bodies, for which its flexibility makes it well suited.

Tulip-Tree (*Liriodendron Tulipifera*).—The boards of this tree are sold under the name of *white-wood*, and erroneously under that of *poplar*. Its wood is smooth, fine-grained, easily wrought, and not apt to split. It is used for carving, and ornamental work, and for some kinds of furniture. In the Western States, where pine is more scarce, the joinery, or inside work of houses is commonly executed with this material, and sometimes the outer covering. In common with bass-wood, it forms an excellent material for coach and chaise pannels.

Maple.—The rock-maple (*Acer saccharinum*) and several other species afford wood which is smooth, compact, and hard. It is much used for cabinet furniture, and is a common material for gunstocks. The wood in some of the old trunks, is full of minute irregularities, like knots. These, if cut in one direction, exhibit a spotted surface, to which the name of *bird's-eye* maple is given; while if cut in another direction, they produce a wavy or shaded surface, called *curled* maple. This last effect, however, is more frequently produced by a mere serpentine direction of the fibers. The distinctness of the grain may be increased by rubbing the surface with diluted sulphuric acid. Maple-wood forms a good fuel. It is not very lasting when exposed to the weather. The sap of the rock-maple, and of one or two other species, yields sugar on being boiled.

Birch.—The white or paper birch (*Betula papyracea*) has properties similiar to those of the maple, and is appropriated to the same uses. Its cuticle, or outer bark, is made by the Indians into canoes. The lesser white birch (*B. Populifolia*) is a perishable tree of little value. The black birch (*B. lenta*) known for its aromatic bark, affords a firm, compact, dark-colored wood, much valued for furniture, and sometimes used for screws and implements requiring strength. The yellow birch (*B lutea*) is applied to the same uses as the last, and makes good fuel.

Button-wood.—The button-wood or plane-tree (*Platanus occidentalis*) is, in some of the Northern States improperly called *sycamore*. It is one of the largest inhabitants of the forest, and Michaux states that trees are found in the Western States which measure forty feet in circumference. This majestic tree is chiefly valuable for its shade, as the wood is perishable and prone to warp.

Persimmon (*Diospyras Virginiana*).—The heart-wood is dark-colored, compact, hard, and elastic; and is used in the Southern States for screws, shafts of chaises, and various implements.

Black Walnut (*Juglans nigra*).—This tree is rarely found north of New York. Its heart-wood is of a violet color, which, after exposure to the air, assumes a darker shade, and finally becomes nearly black. This wood, when deprived of its white part or sap, remains sound for a long time, even if exposed to air and moisture, and is not attacked by worms. It is very strong and tenacious, and, when seasoned, is not liable to warp or split. It is used in the Middle and Western States for furniture, for gunstocks, for naves of wheels, and to a certain extent in house and ship building.

Tupelo.—Different species of the genus (*Nyssa*) have received, in the United States, a great variety of common names, among which, *Tupelo*, *Pepperidge*, and *gum-tree* are the most common. In Massachusetts, the name *hornbeam* is improperly applied to one of them. Their wood is smooth-grained, and remarkable for the decussation or interweaving of the fibers, which renders it almost impossible to split the logs. This quality causes several species to be in demand for naves of wheels, hatters' blocks, and implements requiring lateral tenacity.

Pine.—The American pines exceed all other native trees for the value and variety of their uses. The white pine (*Pinus strobus*) has a very tall, straight trunk, the wood of which is light, soft, homogeneous, and easy to work. It is remarkably exempt from the common fault of timber—that of decaying in the open air and of changing its dimensions with changes of weather. On these accounts, it is extensively employed for most of the common purposes of timber. In the Northern States, masts of vessels are usually made of it. Frames of houses and of bridges are also formed of it; its defect of strength being more than balanced by its steadiness and durability. Its boards form almost the only material used in the Northern States for joiners' work, or inside finishing of houses; and for this use it is exported to other countries. Ornamental carving is commonly executed in this material. The Southern pitch-pine (*Pinus palustris, L.*) covers extensive barrens in the Southern States, and yields vast quantities of tar and turpentine. Its wood is appropriated to the same objects as that of white pine, but it is harder and stronger, and therefore preferred for planks, spars, floors, decks, etc. Many other species of pine exist on this continent, partaking of the qualities already described, but most of them harder than the white pine.

Spruce.—The black and white spruce belong to that race of trees commonly called *firs*. They are both valuable, but the black spruce (*Pinus nigra*) unites in a peculiar degree the qualities of strength, elasticity, and lightness, together with the power of resisting exposure to the weather. It is much sought after for the smaller spars of vessels, such as the booms, yards, and topmasts.

Hemlock.—The hemlock-tree (*Pinus Canadensis*) is inferior to the other firs in quality, though it grows to a large size. It is coarse-grained, often twisted, and cracks and shivers with age. It furnishes an inferior sort of boards used in covering houses. Its bark is valuable in tanning.

White-Cedar.—This tree (*Cupressus thuyoides*) occupies large tracts denominated cedar swamps. The wood is soft, smooth, of an aromatic smell, and internally of a red color. It is permanent in shape, and very durable; and esteemed as a material for fences. Large quantities of shingles are made of it. It is a favorite material for wooden wares, and the nicer kinds of coopers' work.

Cypress.—The cypress-tree of the Southern States (*Cupressus disticha*) is light, soft, and fine-grained, and at the same time elastic, with a considerable share of strength. It sustains heat and moisture for a long time without injury. In the Southern States, and on the Mississippi, it is much employed for fences, and for the frames, shingles, and inside work of houses.

Larch.—The American larch (*Pinus microcarpa*) is called *hackmatack* and *tamarack* in different parts of the Union. It is strong, elastic, and durable; and is highly prized in places where a sufficient quantity can be obtained for civil and naval architecture.

Arbor Vitæ.—This tree (*Thuja occidentalis*) is of the middle size, and frequently called white cedar. The wood is reddish, fine-grained, soft, and very light. It bears exposure to the weather with very little change, and is esteemed for the posts and rails of fences.

Red Cedar (*Juniperus Virginiana*).—The name of *savin* is in some places improperly applied to this tree. Unlike the white cedar, it grows in the driest and most barren soils. The trunk is straight and knotted by small branches. The heart-wood is of a bright red color, smooth and moderately soft. It exceeds most other native trees in durability, and is in particular request for posts of buildings, though it is difficult to obtain it of large size.

Willow.—The most common kinds of *Salix*, or willow, about our seaports are European species, which have become naturalized. Their wood is soft, light, and spongy. Willow charcoal is used in the manufacture of gunpowder. The osier, and some other species with long slender shoots, are extensively cultivated to form wicker-work, such as baskets, hampers, and the external coverings of heavy glass vessels.

Mahogany.—In the manufacture of cabinet furniture, mahogany (*Swietenia Mahogani*) has taken precedence of all other kinds of wood. Its value depends not so much on its color as on its hardness, and the invaluable property of remaining constant in its dimensions, without warping or cracking, for an indefinite length of time. The same qualities which render it suitable for furniture have given rise to its employment for the frames of philosophical instruments and of delicate machinery. Mahogany is imported from the West Indies and different parts of Spanish America.

Teak-wood (*Tectonia grandis*).—The teak-tree is a lofty inhabitant of the forests of India, and affords a kind of timber of the highest value in ship-building. This wood is exceedingly hard, firm and durable, and many vessels are built of it in the British eastern dominions.

Lance-wood (*Gnatteria virgata*).—This is a tree of middle size, growing in the West Indies, whence it is imported, chiefly to form the shafts of carriages. It is peculiarly tough, strong and elastic, and surpasses any of our native woods in these respects. Its grain is more close than that of ash, and is therefore more suitable for carving or receiving varnish.

Box-wood.—The box-tree (*Buxus sempervirens*) is imported from the south of Europe. Its wood is of a well-known yellowish color, hard, compact, smooth, tough, and not liable to crack. Musical wind-instruments are commonly made of it, also mathematical measuring instruments. The handles of many tools, and various articles of turners' work, consist of this material. Wood engravings are cut upon the end of the grain of box-wood.

Lignum Vitæ.—The wood of the (*Guiacum officinale*) is employed in the arts under this name. It is dark-colored at the heart, strong, exceedingly hard, and so heavy as to sink in water. It is impregnated with resin, and on this account durable in liquids. Handles of tools, boxes of gudgeons, wheels of pulleys, castors, balls, stop-cocks, mallets, etc., are made of it. It is imported from the West Indies and South America. Several other tropical woods are imported for use by cabinet-makers, such as *rose-wood*, *ebony*, *satin-wood*, etc. They are generally hard, colored woods, susceptible of a fine polish. Satin-wood is thought poisonous to the hands of the workmen.*

PROPERTIES AND COMPOSITION OF WOOD.—The function of the woody tissue of plants, in a physiological point of view, is to support the various deciduous organs for digestion, respiration, etc., being in this respect similar to that of bones in animals; to receive certain secretions, and to contain the sustenance necessary for the newly-forming parts before a more direct communication is established between them and the soil. Though perfectly homogeneous to the naked eye, woody tissue is perceived, when examined by the microscope, to be composed of long, thin, transparent, tough, membraneous tubes, which seem to be originally derived, like all other solid parts of plants, from a simple rounded cell. Woody tissue, though the chief and essential, is not the only constituent of wood or timber. Interspersed between the tubes which form the woody tissue, is the cellular tissue, which consists of cells or cavities closed on all sides, formed of a delicate and usually transparent membrane. Cellular tissue is more abundant in herbs than in trees, and decreases in proportion as the plant attains maturity. In *exogenous* trees it forms perpendicular plates radiating from the pith, as a center, to the bark.

The cross section of a first year's stem of an exogen (to which class belong almost all trees producing woods employed for mechanical purposes in this country) presents, 1st. in the center, pith, composed of cellular tissue; 2d, around the pith a layer composed principally of

* Bigelow's Useful Arts.

woody tissue; 3d, around the woody tissue a layer of bark (composed of several similar layers); and, lastly, 4th, from the pith to the exterior of the wood, lines of cellular tissues, which are sections of the radiating plates above referred to, distinguished as medullary rays, medullary processes, or medullary plates. These are often imperceptible by the naked eye, but always present.

At the commencement of the second year's growth, a spontaneous separation of the layer of wood and the innermost layer of the bark, or *liber*, takes place, and the intervening space becomes occupied with a viscid gelatinous liquid, known as the *cambium*. In this liquid are deposited elongated cells or tubes, which form the woody tissue of another layer of wood immediately surrounding the first year's layer, and the principal part of the cellular tissue that connected the wood and the liber becomes arranged in perpendicular plates, forming continuations of the medullary rays of the first year. This second year's layer of wood is quite similar to that formed in the first year, to which it is firmly attached. The increase of wood goes on in this manner, circle around circle, or rather zone upon zone, each year; so that, with young trees, where the line of distinction between the several layers is easily perceived, the age of the tree may be estimated by the number of layers. Besides the external ring of wood, there is also formed yearly an internal ring of bark (liber), which at length becomes the external ring, those rings previously exterior to it having decayed as the stem increases in diameter. The name of the class of trees having this manner of growth,or exogens, has reference to the external augmentations of woody matter; unlike *endogens*, in which the wood is formed by successive augmentations from the interior.

The length of the medullary plates varies from a quarter of an inch or less, as in the sycamore and maple, to several inches, as in the oak. When viewed by the microscope with a low power, they present a granular appearance; but with a high power, a cellular structure similar to that of the pitch is perceptible. The light and glossy appearance of polished vertical pieces of several kinds of wood, known among carpenters by the term silver-grain, or flower of wood, is produced by the exposure of the medullary plates.

The tubes which form the woody tissue vary in diameter from one thirty-thousandth to one one-hundred-and-fiftieth part of an inch. They taper acutely at each end, and do not appear to have any direct communication with each other; no pores are perceptible in their sides. They are very tough, and usually cylindrical, but have sometimes been observed in a prismatic form.

The reason why the yearly increments of woody matter in exogens are defined (they being in juxta-position, and composed of a similar structure) is, that the woody tissue formed toward the close of the growing season is denser and more compact than that formed at the commencement. If, however, through an equable climate, or any other cause, the tissue formed at the close of the season is quite similar to that formed at the commencement, no distinction between the yearly increments will be perceptible; in the wood of tropical countries, the absence of concentric circles is a very frequent occurrence.

In trees of less than eight or ten years old, there is usually no perceptible difference (excepting the lines of demarcation) between the several layers of woody tissue; but, after the lapse of ten or twelve years, the two or three interior layers become considerably hardened, and pass into the state of timber properly so called. The interior hardened layers are distinguished as the *duramen* and *heart-wood*, and the softer exterior layers as the *alburnum* and *sap-wood.*

The sides of the tubes of the woody tissue forming the alburnum are very thin, and hardly any solid matter is contained in the interior of the tubes, but merely sap; the alburnum being the principal channel through which the sap is conveyed from the roots to the leaves. The alburnum is always lighter in color than the duramen, and, having little solidity and power of adhesion, is readily susceptible of disintegration and decomposition; on which account it is always separated from the heart-wood when the timber is worked up. The superior hardness and durability of the heart-wood is owing to the thickening of the sides of the tubes by the deposition of various solid matters; as the débris of disintegrated tubes and cells, and resins, insoluble compounds of tannin with matters derived from the sap, coloring matters, etc., which impart peculiar characters to different species of woods. The sap-wood has nearly the same appearance in all trees.

In some trees, as oak and teak, the conversion of sap-wood into heart-wood takes place rapidly; in others, as poplar and willow, very slowly, or not at all. The wood of the latter class of trees (which are technically called white-wooded) never acquires the durability of that of the former, and is unfit for any but temporary uses.

After the formation of heart-wood is once commenced, the number of layers of sap-wood usually continues the same at all stages of the growth of the tree; consequently a layer of heart-wood is produced annually. The heart-wood itself is not of the same density throughout; its interior layers gradually attain a maximum density, which is acquired by the other layers in yearly succession. After having remained for some time at the maximum density, the interior layers seem to lose their vitality, becoming lighter in color, softer, weaker, and readily altered by the action of decomposing agents.*

* A difference of opinion has existed among botanists concerning the origin of woody tissues. According to the theory of Du Petit Thouars, as modified by Lindley and others, wood may be considered as the *roots* of the leaves and buds which are sent downward through the cambium, and at length reach the extreme roots of the tree. By their close lateral adherence they form a layer which entirely surrounds the wood of the preceding year, and becomes itself a component part of the new wood. Consistently with this theory, the amount of wood is generally observed to be proportional to the amount of buds; and, if the leaves and branches which grow on one side of a tree are more vigorous than on the other (as may happen from exposure to more light and heat), the thickness of the layers of wood is greater on the side with vigorous leaves and branches than on the other. When the growth of the branches is equal on all sides, the thickness of the layers of wood is also usually equal all around. But leaves are not the only agents by which the woody tissue is developed, for many parts of plants, and some whole orders (as cactaceæ), possess no leaves, and yet develop woody tissue. It has also been proved, by Dr. Lankester, that trees from the stems of which the bark is removed at the spring of the year, will present new woody tissue between the bark and wood at the end of the year

Such is the structure and manner of growth of exogens. With reference to the growth of the other great class of trees, *endogens*, which includes palms, bamboos, grasses, etc., it will be sufficient for our pur pose merely to mention that it is essentially different from that of exo gens, the new woody matter being first developed toward the center of the trunk; whence the name of the class. Endogens are not possessed of a well-defined cylindrical column of pith, nor of medullary rays; the densest part of their section is near the surface, instead of being near the center, as in the heart-wood of exogens.

Wood is unfit to be used for building in the state in which it is felled. The tissues, being then distended with sap, experience a contraction when the water in the sap evaporates; and, if the recently-felled wood is placed in a confined situation, the humid nitrogenized matter in the sap rapidly decomposes, and induces the decomposition or decay of the wood.

To avoid these inconveniences, the wood, before being worked up, is carefully dried or "seasoned," by which it is reduced in bulk across the grain, and the nitrogenized matter of the sap is rendered less susceptible of decomposition. The ordinary process of seasoning wood consists in merely exposing it to a free current of air, the wood being either in the form of planks or logs, or in smaller pieces of about the sizes and forms to which they will afterward be reduced. If the pieces are thin, twelve months' exposure in a dry situation with a free current of air will complete their desiccation to the extent required; but thick pieces often require several years. In general, the closer the grain, the longer is the time required; thus a large piece of oak is not thoroughly seasoned in less than eight or ten years. The exposure ought to be continued until the wood ceases to lose weight from evaporation, but this would require twice the period usually allowed for the process.

The seasoning of wood is said to be effected better and more rapidly by previously washing out or diluting the sap, which may be accomplished by exposing the wood for some weeks to running water, or by boiling the wood in water. A quantity of the soluble matter in the sap is brought to the surface when the wood is exposed to the action of steam, as in the operation for facilitating the bending of oak and other timbers for ship-building, etc.

A patent for an improved method of seasoning timber was obtained in 1825 by Mr. J. Langton, of Lincolnshire, which consists in drying the wood in a vacuum, or in a highly rarefied atmosphere. The timbers are placed vertically in an air-tight cast-iron cylinder connected with an exhausting-pump, and, when exhausted of its air, the cylinder is heated by means of a vapor-bath. The moisture given off from the wood is condensed in an air-tight refrigerator, so as to prevent its reabsorption.

Other circumstances may also be adduced in opposition to the theory which supposes buds to be the only agents concerned in the production of wood. The recent researches of Dr. Schleiden go far to prove that the original cells, which become elongated into tubes forming woody tissue, are developed in the same manner as the cells of the cellular tissue: that is, as excrescences proceeding from particles (cytoblasts) in the sides of anteriorly-formed cells.

The amount of contraction which takes place through desiccation is very different in different woods, being usually greatest in soft woods. In teak-wood the contraction is scarcely perceptible; in some soft woods it amounts to half an inch in the foot.

The entire proportion of water in green woods varies from thirty-eight to forty-five per cent., according to the species and age of the wood; but the whole of the water cannot be removed by drying in the air at common temperatures, however long the desiccation may be continued. Woods from the mulberry-tree, hazel-tree, and linden-tree, cut from branches of mean size at the close of autumn, decreased in weight in six months in the following proportions; mulberry, twenty-six per cent.; hazel, thirty-three per cent.; and linden, forty per cent. After being dried during twelve months, wood generally retains from one-fifth to one-fourth of its weight of water. A beam of oak-wood, kept for a century in a dry situation, was found by Count Rumford to lose nine per cent. of its weight when dried at a high temperature. According to M. Karsten, oak-shavings perfectly desiccated in the air lose 10.3 per cent. of water when heated at 212°; but even at that temperature they retain a sensible quantity of water capable of being expelled at higher temperatures. The woods of the willow and birch, in a state of fine powder, and freed from sap by digestion in boiling water, retain 14.5 per cent. of water after desiccation in the air, for the expulsion of the whole of which the wood must be heated gradually to a temperature near 310° Fahr.

When wood, rendered perfectly dry by the aid of heat, is exposed at common temperatures to the atmosphere in its ordinary state of humidity, it reabsorbs a certain proportion of water, varying according to the compactness of the wood and to the quantity of deliquescent saline matters present. In a dry room without a fire, the quantity absorbed usually amounts to about ten per cent. If covered with a resinous varnish, dry wood does not absorb atmospheric humidity.

In its ordinary state, wood is a conductor of electricity, from the presence of saline solutions; when rendered perfectly dry by the aid of heat, it is a non-conductor, but its conducting power returns upon the absorption of moisture, which takes place on re-exposure to the air.

Although nearly all kinds of wood float on water, yet the density of the true woody fiber is considerably greater than that of water. The apparent lightness of wood is owing to the presence of a large quantity of air in the pores of the wood, which is not displaced by water at common atmospheric pressure without a very long digestion. But if a piece of wood is placed on water in the receiver of an air-pump, and a vacuum made, as the air in the pores of the wood is withdrawn, water enters the pores and the wood sinks.

According to Count Rumford, the specific gravity of the true woody fiber is much the same for all kinds of woods, varying only between 1.46, which is that of fir and maple, and 1.53, which is that of oak and beech. The specific gravity of the different kinds of woods in their ordinary state must therefore indicate their porosity, or the proportion of air within their pores. To take the specific gravity of wood in water for this purpose, the absorption of water by the wood should be prevented by applying to the surface of the wood a resinous varnish of the same density as water, which may be obtained by a mixture in certain proportions of wax and resin.* The first column in the following table exhibits the specific gravity of different woods as adopted by the *Annuaire du Bureau des Longitudes;* the second column contains the results obtained by M. Karmarsch:—

	I.	II.		I.	II.
Box	——	942	Walnut-tree	——	660
Plum-tree	——	872	Pine	657	763
Hawthorn	——	871	Maple	——	645
Beech	852	——	Linden-tree	604	559
Ash	845	670	Cypress	598	——
Yew	807	744	Cedar	561	——
Elm	800	568	Horse-chestnut	——	551
Birch	——	738	Alder	——	538
Apple	733	734	White poplar	529	——
Pear	——	732	Common poplar	383	387
Yoke-elm	——	728	Cork	240	——
Orange-tree	705	——			

The same kind of wood varies considerably in density according to the soil on which the tree is grown, the climate, the age of the wood, and other circumstances. According to Rumford, the specific gravity of a piece of wood taken from the trunk of an oak in active growth is .961; that of billets of oak, cut and dried for a few years, is .883: that of a beam of oak, cut for at least six hundred years, was found to be .682; and that of the same wood when completely desiccated, .610.

Several exotic woods are considerably heavier than those kinds grown in Europe: the wood of the *Guaiacum officinale*, for example, possesses the specific gravity 1.263; the specific gravity of ebony is 1.213. Probably the heaviest of all woods is that known by the name of the iron-bark wood, brought from New South Wales, the density of which is 1.426. Its strength, compared with the English oak, was found by Mr. Holtzapffel to be as 1,557 is to 1,000. The lightest of true woods known in this country is the *Cortica*, or *Anona palustris*, the density of which, according to Mr. Holtzapffel, is only .206. This wood resembles ash in color; but is paler, finer, and softer.

From three to six per cent. of exsiccated wood is composed of solid matters derived from the evaporation of the sap, in which they were previously contained in a state of solution. These consist partly of saline matters, the proportion of which varies in different woods from two parts in a thousand to two per cent. But by far the principal part of the residue of the evaporation of the sap is a substance termed *vegetable albumen*, which closely resembles animal albumen (white of egg) both in properties and composition. It contains nitrogen, and, like animal albumen, is exceedingly prone to decomposition. The use of this substance in the living plant is to lubricate the sides of the various vessels, being the same as that of the mucous membrane of animals. It will be seen in another part of this article that the decay of woody

* The specific gravity of wax is 0.967, and that of resin, 1.070.

fiber is generally an induced effect of contact with vegetable albumen in a state of decomposition. Different woods vary very considerably in the proportion of albumen which they contain.

It has been lately shown, by M. Hartig, that a considerable quantity of *starch* is deposited in the interior of the vessels of the wood, which is capable of being extracted by mechanical means. The proportion of starch is said to be greatest in the winter season. To procure starch from this source, it is recommended to reduce to powder the dried shavings of green wood, and to rub the powder with a quantity of water. After standing for five or ten minutes, the ligneous powder may be separated by decanting the liquid, from which the starch is gradually deposited. Like all other varieties of starch, this substance is colored intensely blue by iodine, and, when examined by the microscope, is perceived to be composed of spherical granules. The taste of its solution in warm water is slightly astringent.

By digesting the sawings of wood or the fiber of lint and cotton, successively, in ether, alcohol, water, a diluted acid, and a diluted caustic alkali, so as to separate all the matters soluble in these liquids, without continuing the action of the acid and alkali so long as to alter essentially the constitution of the wood, there remains behind a white, spongy, pulverulent substance, which is the basis of the wood, or lignin, constituting from 95 to 97 per cent. of all kinds of desiccated wood.

Lignin is possessed of certain physical and chemical properties, which amply distinguish it from every other vegetable principle. These properties are always the same, if the lignin is prepared as above, however great the difference which may exist between the plants, or parts of plants, from which it is prepared. White unsized paper, digested in dilute hydrochloric acid, to remove the earthy matters which it contains, and then washed with distilled water, affords a very pure form of lignin.

In a state of purity, lignin possesses the following properties :—

It is white, tasteless, and inodorous, and presents, when examined by the microscope, a cellular or tubular structure. It is considerably heavier than water, but usually floats on that liquid in consequence of containing air imprisoned within its cells or tubes. It is insoluble in water, alcohol, ether, fixed and volatile oils, diluted alkalies and diluted acids. It dissolves in the most highly concentrated nitric acid, without producing the decomposition of the acid: and, if the solution is immediately diluted with water, it gives a white pulverulent precipitate, which is a neutral substance highly combustible, insoluble in water, containing, according to Robiquet, the elements of nitric acid. Weaker nitric acid converts it into oxalic acid, suberic acid, and other products. When fused with a caustic alkali, lignin is converted into either ulmic acid, or oxalic acid, according to the proportion of alkali and the temperature which is applied.

When lignin is mixed cautiously with concentrated sulphuric acid, so as to avoid elevation of temperature, it is converted partly into dextrin, a gummy substance which is produced by the action of dilute acids and other agents on starch. A portion of the sulphuric acid unites at the same time with some of the ligneous matter to form a compound which has received the names of *lignin-sulphuric acid*, and *vegeto-sulphuric acid*, which forms soluble salts with barytes and oxide of lead. When the above mixture of concentrated sulphuric acid and dextrin is diluted with water and boiled, the dextrin passes into the state of starch sugar.

To prepare starch sugar from this source, six parts of clean hempen or linen cloth, divided into small pieces, is intimately mixed with eight and a half parts of concentrated sulphuric acid added in very small quantities. In the course of half an hour, when the cloth has become converted into a brown viscous mass, entirely soluble in cold water, sufficient water is added to dissolve the mass, and the mixture is boiled for eight or ten hours, fresh water being added from time to time to replace that which is expelled by evaporation. The saccharification is then complete, and the free sulphuric in the solution is separated by the addition of an excess of chalk, which becomes converted into the insoluble sulphate of lime. The filtered liquid leaves a residue of starch sugar on evaporation. According to Mr. Braconnot, twenty parts of lignin afford about twenty-three parts of sugar.

The flame of burning wood proceeds from the combustion of the same kind of gaseous matters as are given off when the wood is subjected to destructive distillation in close vessels. As the proportion of these products is partly dependent on the temperature at which the distillation is conducted, it follows, that, to obtain the largest possible flame, the wood should be dry in order to avoid loss of heat by the evaporation of the water, and in small pieces which may be quickly heated to their center and applied to the fire in small quantities at a time. If the temperature necessary for active combustion is maintained, and sufficient air has access, the combustion of the wood is complete; the only residue being a small quantity of white ash derived from the saline and earthy matters formerly contained in the sap. The carbon of the wood in this case is entirely converted into carbonic acid, and the hydrogen into water, by combining with the oxygen of the air and of the wood. But it is difficult to unite at all times the conditions necessary for perfect combustion, namely, a high temperature and sufficient air; the combustion or oxidation of the volatile products is hence often incompletely effected, and smoke (which consists chiefly of solid particles of a carbonaceous substance) is produced. Compact woods burn only at the surface; the volatile combustible products which produce the flame are quickly disengaged and a mass of charcoal remains which burns away slowly without the production of flame, or at least of the yellow flame which is perceived at the commencement of the combustion. Light, porous woods, which freely admit air to their interior, burn more rapidly than compact woods, and afford a yellow flame almost the whole time of their combustion, leaving a very small residue of charcoal.*

With a view of determining the heating power of different kinds of wood in a state of combustion, a set of experiments was performed by MM. Peterson and Schödler to ascertain the quantity of oxygen required for the combustion of a given weight of the different woods. If the woods are equally dry, the amount of heat disengaged by the combustion

* Parnell's "Applied Chemistry."

is very nearly proportional to the quantity of oxygen which unites with the combustible. The results obtained by MM. Peterson and Schödler are the following :—

Names of trees.	Oxygen required to burn 100 parts of each.
Tila Europea, lime	140.523
Ulmus suberosa, elm	139.408
Pinus abies, fir	138.377
Pinus larix, larch	138.082
Æsculus hippocastanum, horse-chestnut	138.002
Buxus sempervirens, box	137.315
Acer campestris, maple	136.960
Pinus sylvestris, Scotch fir	136.931
Pinus picea, pitch pine	136.886
Populus nigra, black poplar	136.628
Pyrus communis, pear-tree	135.881
Juglans regia, walnut	135.690
Betula alnus, alder	133.959
Salix fragilis, willow	133.951
Quercus robur, oak	133.472
Pyrus malus, apple-tree	133.340
Fraxinus excelsior, ash	133.251
Betula alba, birch	133.229
Prunus cerasus, cherry-tree	133.139
Robinea pseuodacacia, acacia	132.543
Fagus sylvatica, white beech	132.312
Prunus domestica, plum	132.088
Fagus sylvatica, red beech	130.834
Diospyros ebenum, ebony	128.178

Dr. Ure presents at one view the relative heating power of different fuels as follows :—

SPECIES OF COMBUSTIBLE.	Pounds of water which a pound can heat from 0 to 212 deg.	Pounds of boiling water evaporated by 1 pound.	Least weight of atmospheric air at 32 deg. to burn 1 pound.
Perfectly dry wood	35.00	6.36	5.96
Ordinary wood	26.00	4.72	4.47
Wood charcoal	73.00	13.27	11.46
Pit coal	60.00	10·90	9.26
Coke	65.00	11.81	11.46
Turf	30.00	5.45	4.60
Turf charcoal	64.00	11.63	14.58
Oil, wax, and tallow	78.00	14.18	15.00
Alcohol of the shops	52.60	9.56	11.60

The above results can never be obtained in practice, as a large portion of the heat (probably one-seventh to one-half) passes up the chimney, and is wasted. One pound of coal is usually reckoned sufficient to convert seven and a half pounds (nine pounds Watt) of boiling water into steam, or to heat forty-one and a quarter pounds of water from 32° to 212°. One pound of fir-wood will evaporate four pounds of water, or heat twenty-two pounds to 212°.

TIMBER AND ITS PRESERVATION.—A very great expense is every year created by the premature decay of wood employed in ships, and other structures which are exposed to the vicissitudes of the weather, and especially if they are subjected to the influence of warmth combined with moisture. Trees of different species vary greatly in the durability of their wood, yet none of the species commonly employed are capable of withstanding for many years the effect of unfavorable exposures and situations. The decay in timber is sometimes superficial and sometimes internal. In the former case, the outside of the wood first perishes and crumbles away, and successive strata are decomposed before the internal parts become unsound. In the other species, which is distinguished by the name of the *dry-rot*, the disease begins in the interior substance of the wood, particularly in that which has not been well seasoned, and spreads outwardly, causing the whole mass to swell, crack, and exhale a musty odor. Different fungous vegetables sprout out of its substance, the wood loses its strength, and crumbles finally into a mass of dust. This disease prevails most in a warm, moist, and confined atmosphere, such as frequently exists in the interior of ships, and in the cellars and foundations of houses. Its destructive effects in ships of war have given rise to numerous publications. Some writers consider that the dry-rot is not essentially different from the more common kinds of decay. But there seems to be sufficient reason for the distinctions which have usually been drawn. The prevention of the evil has been attempted in various ways, and with some degree of success.

Felling.—It is agreed by most writers that the sap of vegetables is the first cause of their fermentation and decay. Hence it appears desirable that if there is any season in which the trunk of a tree is less charged with sap than at others, that this time should be selected for felling it. The middle of summer and the middle of winter are undoubtedly the periods when the wood contains least sap. In the months of spring and fall, in which the roots prepare sap but no leaves exist to expend it, the trunk is surcharged with sap; and in many trees, as in the maple and birch, sap will flow out at those seasons, if the trunk is wounded. In the summer, on the contrary, when the leaves are out, the sap is rapidly expended, and in winter, when the roots are dormant, it is sparingly produced; so that no surplus of this fluid apparently exists. From reasoning *à priori*, it would seem that no treatment would be so effectual in getting rid of the greatest quantity of sap, as to girdle the tree, by cutting away a ring of alburnum in the early part of summer, thus putting a stop to the further ascent of the sap, and then to suffer it to stand, until the leaves should have expended, by their growth or transpiration, all the fluid which could be extracted by them previously to the death of the tree. The wood would then probably be found in the dryest state to which any treatment could reduce it in the living state. Buffon has recommended stripping the trees of their bark in the spring, and felling them the following autumn. This method is said to harden the alburnum, but the cause is not very apparent, nor is the success at all certain.*

* After repeated and careful experiments as to the effect which the felling of timber in particular seasons has upon its durability, the editor is fully convinced that timber felled very soon after *the leaves attain their full size* in spring, and when *the bark slides easily from the trunks*, will be heavier when fully seasoned, much more durable, some varieties lasting three times as long as the same varieties felled in winter, and also less subject to worms. The leaves of the tree, like the lungs of man, serve to perfect its circulating fluids, and fit them, in the one case, to form bone, muscle, etc., and in the other, woody fiber. At no time is the sap more completely elaborated than when the leaves have first attained their full maturity and are performing their functions with the greatest vigor and activity; and a tree felled at this time, or girdled thoroughly as suggested in the text, will contain less unelaborated sap than if done at any other season of the year, and will therefore be more durable. If any of our readers doubt, and are still inclined to cut timber at a particular time of the moon in February, let them make an experiment upon some

Seasoning.—At whatever time timber is felled, it requires to be thoroughly seasoned before it is fit for the purposes of carpentry. The object of seasoning is partly to evaporate as much of the sap as possible, and thus prevent its influence in causing decomposition; and partly to reduce the dimension of the wood, so that it may be used without inconvenience from its further shrinking. Timber seasons best when placed in dry situations, where the air has free circulation around it. Gradual seasoning is considered a better preservative of wood than a sudden exposure to warmth, even of the sun; for warmth abruptly applied, causes cracks and flaws from the sudden and unequal extraction of moisture from the different parts. Two or three years' seasoning is requisite to produce tightness and durability in the wood-work of buildings. It must be observed, that seasoning in the common way only removes a portion of the aqueous and volatile matter from the wood. The extractive and other soluble portions still remain and are liable to ferment, though in a less degree, whenever the wood reabsorbs moisture. Such, indeed, is the force of capillary attraction, that wood exposed to the air in our climate never gives up all its moisture. Seasoning by stove-heat, in buildings constructed for the purpose, has been found to answer well, and to save much time, especially in boards partly seasoned before.

Preservation of Timber.—When wood is to be kept in a dry situation, as in the interior of houses, no other preparation is necessary than that of thorough seasoning. But when it is to be exposed to the vicissitudes of the weather, and still more when it is to remain in a warm and moist atmosphere, its preservation often becomes extremely difficult. Numerous experiments have been made, and many volumes written, upon the preservation of timber, and the prevention of dry-rot; but the subject is not yet brought to a satisfactory conclusion. The methods which have hitherto been found most successful, consist in extracting the sap, in excluding moisture, and in impregnating the vessels of the wood with antiseptic substances.

For extracting the sap the process of *water seasoning* is recommended. It consists in immersing the green timber in clear water for about two weeks; after which it is taken out and seasoned in the usual manner. A great part of the sap, together with the soluble and fermentable matter, is said to be dissolved or removed by this process. Running water is more effectual than that which is stagnant. It is necessary that the timber should be sunk so as to be entirely under water, since nothing is more destructive to wood than partial immersion. Mr. Langton has proposed to extract the sap by means of an air-pump, the timber being inclosed in tight cases, with a temperature somewhat elevated, and the sap being discharged in vapor by the operation of the pump.

It appears extremely probable that if trees were felled in summer, and the buts immediately placed in water, without removing the branches, a great part of their sap would be expended by the vegetative

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quickly-decaying wood—as white bass-wood, and they can soon prove to themselves the importance of cutting timber at the proper season.

process alone, and replaced by water. It is well known that branches of plants, if immersed in water, continue to grow for some days, to transpire, and to perform their other functions. This they probably do at the expense of the sap or assimilated fluid which was previously in them, while they replace it by the water they consume. This state of things continues till the juices are too far diluted to be capable of any longer sustaining life.

The charring of timber by scorching, or burning it outside, is commonly supposed to increase its durability, but on this subject the results of experiment do not agree. Charcoal is one of the most durable of vegetable substances; but the conversion of the surface of wood into charcoal, does not necessarily alter the character of the interior part. As far, however, as it may operate in excluding worms, and arresting the spread of an infectious decay like dry-rot, it is useful. Probably also, the pyroligneous acid, which is generated when the wood is burnt, may exert a preservative influence.

The exclusion of moisture by covering the surface with a coating of paint, varnish, tar, etc., is a well known preservative of wood which is exposed to the weather. If care is taken to renew the paint as often as it decays, wood, on the outside of buildings is sometimes made to last for centuries. But painting is no preservation against the internal or dry-rot. On the contrary, when this disease is begun, the effect of paint, by choking the pores of the wood and preventing the exhalation of vapors and gases which are formed, tends rather to expedite, than prevent the process of decay. Paint itself is rendered more durable by covering it with a coating of fine sand. Wood which is not thoroughly seasoned, should never be painted.

The impregnation of wood with tar, bitumen and other resinous substances undoubtedly promotes its preservation. It is the opinion of some writers, that "woods abounding in resinous substances, cannot be more durable than others," but the reverse of this is proved every year in the pine forests of this country, where the *light-wood* as it is called, consisting of the knots and other resinous parts of pine-trees, remains entire, and is collected for the purpose of affording tar, long after the remaining wood of the tree has decayed. A coating of tar or turpentine, externally applied to seasoned timber, answers the same purpose as paint in protecting the wood, if it is renewed with sufficient frequency. Wood impregnated with drying oils, such as linseed-oil, becomes harder, and more capable of resisting moisture. It is frequently the practice in this country, to bore a perpendicular hole in the top of a mast, and fill it with oil. This fluid is gradually absorbed by the vessels of the wood, and penetrates the mast to a great distance. Animal oils, in general, are less proper for this purpose, being more liable to decomposition.

The preservative quality of common salt (*muriate of soda*) is well known. An example of its effect is seen in the hay of salt marshes, which is frequently housed before it is dry, and which often becomes damp afterward from the deliquescence of its salt, yet remains unchanged for an indefinite length of time. In the salt-mines of Poland and Hungary, the galleries are supported by wooden pillars, which are found to last unimpaired for ages, in consequence of being impregnated with salt, while pillars of brick and stone used for the same purpose, crumble away in a short time by the decay of their mortar. Wooden piles driven into the mud of salt flats and marshes last for an unlimited time, and are used for the foundations of brick and stone edifices. In canals which have been made in the salt marshes about Boston, and other places, trunks of oak-trees are frequently found with the heart-wood entire and fresh, at a depth of five or six feet below the surface. At Medford, Massachusetts, the stumps of trees are found standing in the gravelly bottom of the salt marsh, where the tide rises in the canals four or five feet above them. This bottom must originally have constituted the surface of the ground, and must have settled long enough ago for the marsh mud to have accumulated, as it has done for miles around, apparently since that period.

The application of salt in minute quantities is said rather to hasten than prevent the decay of animal and vegetable bodies. Yet the practice of *docking* timber, by immersing it for some time in sea-water, after it has been seasoned, is generally admitted to promote its durability. There are some experiments which appear to show, that after dry-rot has commenced, immersion in salt water effectually checks its progress, and preserves the remainder of the timber.* In some of the public ships built in the United States, the interstices between the timbers are filled with dry salt. When the salt deliquesces, it fills the pores of the wood with a strong saline impregnation, but it has been said in some cases to render the inside of the vessel uncomfortably damp. If timber is immersed in a brine made of pure muriate of soda, without the bitter deliquescent salt which sea-water contains, the evil of dampness is avoided.

A variety of other substances besides common salt act as antiseptics, in preventing the dry-rot and the growth of the fungus which attend it. Nitre and alum have been recommended for this purpose, and some of the metallic salts are considered still more effectual. Of these, the sulphates of iron, copper, and zinc have the effect to harden and preserve the timber.†

Wood boiled in a solution of the former of these, and afterward kept some days in a warm, dry place, is said to become impervious to moisture. Lime-water has recently been found to be a powerful anti septic. Corrosive sublimate as recommended by Sir H. Davy, is perhaps the most powerful preservative of organized substances from decay, and proves destructive to parasitic vegetables and animals; but its safety, in regard to the health of crews, if used in large quantities about the wood of a ship, may be considered as doubtful.

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* The British frigate Resistance, which went down in Malta harbor, and the Eden, which was sunk in Plymouth Sound, were both affected with dry-rot. These ships, after remaining many months under water, were raised, and it was found that the disease was wholly arrested. Every vestige of fungus had disappeared, and the ships remained in service afterward, perfectly free from any further decay. *Supplement to the Encyclopedia Britannica*, iii., 682.

† Bigelow's Useful Arts.

An opinion has been supported in this country, that the decay of timber in ships, by dry-rot, is owing to the impure atmosphere generated by bilge-water, and that it is to be remedied by constructing ships with a view to their free and effectual ventilation.

PRESERVATION OF ANIMAL TEXTURES.—The solid and fibrous portions of organic bodies, such as wood, bone, shell, horn, hair, cotton, etc., are most easy of preservation. But the soft and succulent parts, such as the pulp of vegetables, and the flesh of animals, are extremely perishable, owing to the decomposing influence of their fluid contents; and require the assistance of art to communicate to them any degree of durability. These substances, when they cannot be dried, are usually preserved by enveloping or impregnating them with antiseptics. For alimentary substances, the antiseptics used are sugar, alcohol, salt, and the acetous and pyroligneous acids; while for scientific specimens and preparations, alcohol, oil of turpentine, resinous, and bituminous varnishes, alum, and corrosive sublimate, are found most effectual.

PRESERVATIVE MATERIALS.—DETAILS OF THEIR APPLICATION.—If the decay of wood is, in the first place, an induced effect of the contact of decomposing albumen, a means of preserving the wood is naturally suggested in the removal of the albumen; or else in so modifying it, by causing it to combine with other substances, that it shall no longer possess the property of decomposing spontaneously.

The solubility of albumen in cold and tepid water affords a simple means of withdrawing from the wood this element of decomposition. Unless the wood is in very thin pieces, however, the removal of the albumen by the process of washing in water is extremely slow. To test the efficacy of merely washing in water, equal weights of washed and unwashed wood, equally dry, were moistened with the same quantity of water, and the amount evaporated was replaced in each quantity equally. In the course of a few weeks the unwashed wood was always found to be covered with a thick mould, while none appeared on the washed wood for six months. At the expiration of that period the unwashed wood was found to have sensibly diminished in weight, while the weight of the washed wood remained unaltered (Dr. Boucherie). As the decay of wood advances, the proportion of soluble matter decreases from five or six to less than one per cent.

But as the removal of the albumen seems to diminish the adhesion of the fibers and the tenacity of the wood, a better method of preserving wood is to cause the albumen to enter into combination with another substance, to form a compound which is insoluble in water, and not susceptible of spontaneous decomposition. This is the mode of action of all the antiseptic substances which have been of late applied to wood, either in aqueous solution or in the form of vapor, as effectual preventives of decay.

Corrosive sublimate, or chloride of mercury, is one of the most efficient of these antiseptic applications. It was proposed by Mr. Kyan as a preventive of dry-rot, under the idea of its acting as a poison to the fungi and insects which were the supposed cause of the disease. But this explanation of the action of corrosive sublimate is no longer tenable, as it is now generally admitted that the fungi and insects are not to be considered the origin, but the result of dry-rot. It has been suggested that its action depends on the formation of a compound of lignin, or pure woody fiber, with corrosive sublimate, which resists decomposition in circumstances where pure lignin is liable to decay; but pure lignin possesses no tendency to combine with corrosive sublimate. The action of this substance is in reality confined to the albumen, with which it unites to form an insoluble compound not susceptible of spontaneous decomposition, and therefore incapable of exciting fermentation. Vegetable and animal matters, the most prone to decomposition, are completely deprived of their property of putrefying or fermenting by the contact of corrosive sublimate. It is on this account advantageously employed as a means of preserving animal and vegetable specimens. Its expensiveness in this country is a great obstacle to its extensive employment, but few antiseptic applications are more effectual. In Mr. Kyan's process the wood to be impregnated is sawed up into blocks or planks, and soaked for seven or eight days in a solution containing one pound of corrosive sublimate to five gallons of water. The impregnation is sometimes effected in an open tank, and sometimes in an air-tight vessel, from which the air is first exhausted by a pump as far as possible; and the solution is then pressed into the pores of the wood under a force of about a hundred pounds to the square inch.

To test the efficacy of Mr. Kyan's process, protected and unprotected pieces of timber were placed in a trench in the Royal Arsenal at Woolwich, in contact with putrefying vegetable matter, and with pieces of wood affected with dry-rot; and the trench was covered with horse-dung to increase the temperature and accelerate the decomposition. At the expiration of five years the protected wood was found to be unaltered, while the same kind of wood, unprotected, became considerably affected before the end of the first year.

The action of almost all beneficial materials for impregnating wood may be considered of the same nature as that of corrosive sublimate.

The most ancient means of preserving wood consists in the application of an external resinous or oleaginous covering, by which air and water are effectually excluded. If the wood is dry and in a sound state before the covering is applied, perfect protection might be thus afforded, provided the wood is not exposed to abrasion. It is essential that the wood be made thoroughly dry previous to the application of a protective varnish, else its decay is hastened by the impediment which the varnish offers to the evaporation of the moisture.

The more effectual method of impregnating the wood throughout its mass with a chemical preservative agent was not practiced to any great extent until the last century. The principal substances which have been proposed for that purpose are the following. (See Mr. John Knowles's "Inquiry into the Means which have been taken to Preserve the British Navy, particularly from Dry-Rot." 1811.)

Tar.	Sulphate of magnesia.
Sulphate of copper.	Sulphate of barytes.
Sulphate of iron.	Sulphate of soda.
Sulphate of zinc.	Alum.
Sulphate of lime	Carbonate of soda.

- Carbonate of potash.
- Carbonate of barytes.
- Sulphuric acid.
- Acid of tar (pyroligneous acid).
- Common salt
- Vegetable oils.
- Animal oils.
- Coal-oil (naphtha).
- Resins.
- Quick-lime.
- Glue.
- Corrosive sublimate.
- Nitrate of potash.
- Arsenical pyrites water (containing arsenious acid).
- Peat-moss (containing tannin).
- Creosote and eupion.
- Crude acetate or pyrolignite of iron.
- Peroxide of tin.
- Oxide of copper.
- Nitrate of copper.
- Acetate of copper.
- Solution of bitumen in oil of turpentine
- Yellow chromate of potash.
- Refuse lime-water of gas-works.
- Caoutchouc dissolved in naphtha
- Drying oil.
- Beeswax dissolved in turpentine.
- Chloride of zinc.

Sulphate of copper (blue vitriol), sulphate of iron (green vitriol), and sulphate of zinc, have been employed for a considerable time as preservatives against dry-rot. An objection to the use of sulphate of iron, and especially the persulphate, has been suggested by M. Bréant, in its property of being decomposed into the insoluble subsulphate of iron and free sulphuric acid by the woody fiber, which combines with the subsulphate, while the free sulphuric acid exercises a corrosive action on the timber, and often causes it to become almost pulverulent. These inconveniences may be obviated by first injecting some oily material into the pores of the wood. In the process for preserving animal and vegetable matters from decay, patented by Mr. Margary in 1837, the wood, previously dried, is soaked in a solution of one pound of sulphate of copper in five gallons of water; and is allowed to remain in the liquid two days for every inch of its thickness. Instead of the above solution, another is sometimes made use of, composed of a pound of acetate of copper dissolved in fourteen quarts of water with two quarts of crude pyroligneous acid. Like chloride of mercury, sulphate of copper acts by forming an insoluble and stable combination with albumen.

Contact with alkalies and alkaline earths greatly accelerates the decay of wood, for these substances enable woody fiber and several other organic matters to absorb oxygen, which do not possess the power of themselves. Thus alcohol, which does not, if pure, absorb oxygen from the air at common temperatures, when mixed with potash, absorbs it with avidity, becoming converted into acetic acid, formic acid, and other oxidated products. Several vegetable coloring matters, gallic acid, tannin, and other substances, are affected by alkalies in a similar manner.

An experiment on the durability of timber seasoned with lime was made some years ago on a part of the frame-work and some of the timbers of the Amethyst frigate. At the expiration of ten years, the prepared timbers were found to be in a worse condition than the unprepared.

Alum effectually counteracts the decomposition of the albuminous matter of the wood; but it cannot be employed as a preservative material, from its decomposition, under the influence of the woody fiber, into the insoluble subsulphate of alumina, which attaches itself to the fiber, and free sulphuric acid, which exerts a corrosive action on the wood. The soluble subsulphate of alumina (basic alum) would be free from this objection to common alum, and, if made without excess of alkali, might probably be found an efficient application.

The antiseptic property of common salt is not without an application in the preservation of wood. The durability of the beams and other timber-work in salt-mines is attributable to the action of the salt in restraining decomposition. If kept in a tolerably dry atmosphere, wood impregnated with a solution of common salt resists decomposing agents for a considerable time, and it has been observed that ships employed in the salt trade are more durable than most others built of the same kind of timber. For a first cargo for ships built along the shores of the Baltic the preference is generally given to salt.

But the deliquescent nature of this substance, in the state it is commonly met with, prevents its employment as a preservative for wood intended for general purposes. For buildings, however, in which the temperature is usually high, wood thus prepared would be found durable and economical. Pure salt has very little deliquescent property; that possessed by the salt met with in commerce is chiefly due to traces of chloride of calcium and chloride of magnesium.

The durability of ships employed in the salt trade has been referred to the thorough desiccation of the timbers by the hygroscopic property of common salt. More than ordinary durability is also ascribed to ships employed in conveying quick-lime; an effect of lime which is hardly referable to any other mode of action, for the impregnation of the wood with lime-water would only facilitate its decay.

The saturation of wood with vegetable and animal oils, with a view to its preservation, has been practiced in America to a considerable extent. This application of oil appears to have been known to the ancients, and was recommended by Dr. Hales in 1756. The imbibition of the oil by the wood is extremely slow, but the protection thus afforded is very considerable. To facilitate the impregnation, it has been proposed first to expel the air and moisture in the wood by the application of heat; and as a temperature approaching 600° Fahr. may be attained in an oil-bath, the oil has been made the medium of drying and expelling the air as well as of impregnating the timber; but the wood which had undergone this process was found to have diminished in tenacity, and its fibers were easily separated from each other. (See Knowles's "Inquiry," before referred to.)

In 1811 a proposal was made by Mr. Lukin to impregnate wood with the vapor produced from fixed oils, and extensive works were erected for preparing wood for government purposes by such a process. But most of the timbers submitted to the vapor became cracked, and rendered quite unfit for the construction of ships. The building in which the impregnation was effected, the length of which was thirty-two feet, and the breadth twelve feet, at last exploded; but the trial was quite adequate to prove the insufficiency of the process.

From the general nature of the action of arsenious acid on animal and vegetable substances, its efficacy as a preservative material for wood may be assumed. Mundic water containing arsenic, produced by the oxidation, through the air, of arsenical iron pyrites in contact with water, was proposed for this purpose, by Mr. Lukin, in 1812; but the use of this material was abandoned from its injurious effects on the workmen; the death of two persons being produced through some preliminary experiments to determine the value of the process.

The durability of wood is greatly increased by being impregnated with tannin, which acts on the albuminous matter in the same manner as corrosive sublimate. The preservation, for several ages, of large branches and trunks of trees imbedded in peat is wholly referable to this action of the tannin and analogous substances contained in the peat. With a view of producing in fresh oak-wood the same change which it experiences in bogs, it has been proposed to keep the wood surrounded for some time with peat-moss; but the experiments undertaken to test the efficiency of the process were failures, from the difficulty of carrying the impregnation to any extent. The wood which is taken from bogs, however, when exposed to the weather, becomes weak in the fiber, splits, and is soon impaired in quality.

The remarkable antiseptic property of creosote has suggested the application of this substance as a preservative for wood. Creosote is an unctuous liquid found among the products of the distillation of wood, and is contained in the tar of some kinds of wood to the amount of one fifth or one fourth of the weight of the tar. In an impure state creosote may be obtained by merely subjecting wood-tar to redistillation and rejecting the first products, but for its preparation in a pure state, a more complicated process is necessary.

The efficacy of tar as an external application to wood may be principally referred to the action of the creosote and eupion which it contains on the albuminous matter in the wood, in the same manner as corrosive sublimate. With the view of effecting a deeper impregnation, it has been proposed to steep the wood in boiling tar; but exposure to a boiling liquid for a short time has always the effect of diminishing the tenacity of wood. On comparing the strength of two pieces of timber, one having been boiled in tar, and the other in its ordinary state, but quite similar in other respects, the strength of the boiled timber was found to be one seventh less than that of the unboiled. The wood, however, is rendered better capable of resisting decomposition and suffers an increase in density and hardness. The process is expensive, and too tedious to be generally adopted.

A patent has been obtained in Great Britain by M. F. Moll for a method of impregnating wood with creosote by exposing it to the vapor of the *oil of wood-tar*, which is the product of the distillation of the tar.

The first product which passes over when wood-tar is distilled consists for the most part of eupion. When the distillation has been carried so far that the product has about the same specific gravity as water, the receiver is changed, and some lime, or an alkali, is added to the distilled liquid to neutralize the free acid which it contains. On applying a much stronger heat to the tar, impure creosote distills over.

The wood is exposed to the action of the vapors of eupion and creosote in a cast-iron chamber or tank, furnished with some means for applying heat by steam. The wood should be arranged vertically, if convenient; but if not, it should rest on an iron grating, so that the vapor obtains free access to the surface of the wood. Before the timber is exposed to the tarry vapor, the tank is heated to a temperature of about 90° or 100° Fahr.; and after some time, the water expelled from the wood is drawn off, and the vapor of eupion admitted by a pipe from a contiguous boiler. The timber is exposed, in the next place, to the vapor of creosote; and is, lastly, soaked for some time in hot liquid creosote.

The length of time during which the wood should be submitted to these successive operations depends entirely on its hardness and density. As a means of estimating the progress of the different processes, it is recommended to attach to the tank a small test-chamber containing a small piece of the same kind of wood as that in the tank. By observing the progress of the test, that of the large piece may be easily judged by an experienced workman.

This process may be made, without doubt, an effectual means of preserving the wood from decay, but it would seem to be too much complicated and expensive for general adoption on the large scale.

The use of the aqueous solution of creosote for preserving wood has been patented by Mr. Samuel Hall. One hundred parts of water at common temperature dissolve only about 1.25 parts of creosote.

Peroxide and perchloride of tin, and oxide, chloride, and nitrate of copper, are preserving materials, for the use of which a patent was obtained by Mr. Richard Treffry in 1836. To impregnate wood (or any other vegetable material) with oxide of tin or oxide of copper, it is first soaked in a mixture of a pound of quick-lime with about four gallons of water, or else in a solution of a pound of soda-ash (containing about forty-five per cent. of alkali) in four gallons of water. When taken out of the alkaline solution, the wood is well washed, and, if convenient, dried. It is next dipped into another tank, containing a solution of either perchloride of tin, chloride of copper, or nitrate of copper. It is immaterial whether the wood is first impregnated with the alkali or the metallic solution, if the superfluous liquid remaining on the surface after the first immersion is carefully removed. The metallic salt preferred by the patentee for wood is chloride of copper, a pound of which may be dissolved in six pounds of water, and a sufficient quantity of the solution used to cover the timber completely. When dry, the timber is ready for use. It is stated by some authorities, that the chloride, nitrate, and acetate of copper, may also be applied to wood with advantage by themselves.

The use of a solution of bitumen in oil of turpentine, applied externally as a paint, has been patented by Mr. R. Newton. According to the specification of the patent, the method preferred for making the solution of bitumen is the following:—the bitumen is melted in an iron boiler heated by means of steam, and ten per cent. of common turpentine is added during the melting. When fluid, seventy-five per cent. of oil of schistus, or other mineral oil, is added, the mixture stirred, again heated, and afterward poured out into an iron vessel to cool. When cold, there are added, first, twenty-five per cent. of common turpentine, and afterward ten per cent. of hydrate of lime previously sifted and mixed with a small quantity of the liquid. This mixture is said to remain in a permanently liquid state at common temperatures.

The use of a solution of yellow chromate of potash as a preservative agent has been patented by Mr. John Bethell (July, 1838). The bichromate of potash would probably be found a more efficient preservative material than the yellow chromate. Mr. Bethell's patent also includes the application of the refuse lime-water of gas-works; of a solution of caoutchouc in naphtha or turpentine, alone, or mixed with rape-oil, coal-tar, or wood-tar, of a solution of bees'-wax in turpentine, and of drying oil and turpentine. These mixtures are said to impart to the wood both durability and impermeability to water.

The process patented by Sir William Burnett in 1838, for preserving wood and other vegetable matters from decay, consists in impregnating them, in the ordinary manner, with a solution of chloride of zinc, containing one pound of the chloride to five gallons of water. The time required for the digestion of the wood in the solution at common atmospheric pressure varies from ten to twenty-one days, according to the thickness of the wood. Pieces of four inches in thickness, or less, require ten days; pieces of from four to eight inches require fourteen days; and pieces above eight inches require twenty-one days. The timber should be dried in a sheltered situation. It is recommended as an additional precaution that a paint composed of oxide of zinc and drying oil be applied to the wood externally.

The protection from decay afforded to wood by chloride of zinc is said to equal that afforded by corrosive sublimate. Chloride of zinc is better adapted to the preservation of shipping than corrosive sublimate, as the compound which oxide of zinc produces with vegetable albumen is insoluble in sea-water, unlike the compound of oxide of mercury and vegetable albumen. Specimens of English oak, English elm, and Dantzic fir, remained perfectly sound for five years in the fungus test-pit at Woolwich Dockyard; but similar unprepared pieces introduced at the same time soon became affected with decay and fungus. The protection afforded to canvas and cordage by chloride of zinc appears to be greater than that by chloride of mercury.

The impure mixture of acetate of peroxide and acetate of protoxide of iron (pyrolignite of iron, or dyers' iron liquor), obtained by digesting rusty iron nails, etc., in the crude acetic acid afforded by the distillation of wood, is one of the most economical and efficient of the preservative agents. It forms a stable compound with albumen; its acid, when free, exerts no corrosive action on the wood, and being volatile, may be easily expelled from the wood, if necessary, by the application of heat; and lastly, the crude acetate contains a considerable quantity of creosote. It is said that vegetable matters which easily enter into a state of putrescence, as paste and pulps of carrot and beet-root, are rendered almost inalterable in the air by being soaked in a solution of the crude acetate.

The iron liquor generally employed for preserving wood has the specific gravity 1.056.

To determine the relative amount of protection from decay afforded by the most important of the preceding preservative agents to vegetable matters placed in the same conditions as to moisture and temperature, Dr. Boucherie instituted a set of experiments on wheat flour and pulp of beet-root, of which the following are the results. The experiments, which were all performed at the same time, consisted in mixing equal weights of the vegetable matter, equally moist, with different quantities of the bodies, the protective power of which was to be determined.

In all the experiments with wheat flour, sixty-two grammes were mixed with thirty grammes of water containing the preservative material in solution. A mixture of flour and water only, made for comparison, became completely covered with mould, and evolved a considerable quantity of putrid gas, on the eighth day after being made.

Chloride of mercury.—Three experiments were performed with this substance, in which two, four, and six decigrammes were dissolved in the thirty grammes of water for mixing with the flour. No alteration had taken place in either of the mixtures at the expiration of two months.

Sulphate of iron.—In five experiments with sulphate of iron, in which from two decigrammes to two grammes were dissolved in thirty grammes of water, the appearance of the mould was retarded only a few days. In each mixture it was complete on the twelfth day.

Pyrolignite of iron.—In an experiment in which one decigramme of dyers' iron liquor of specific gravity 1.055 (11° Twaddell) was mixed with the usual quantity of flour and water, a slight mould appeared on the tenth day; with two decigrammes, on the twelfth day; with three decigrammes, on the fifteenth day; with four decigrammes, on the twentieth day: with five decigrammes and upward, no mould was perceptible up to the sixtieth day.

Arsenious acid.—With two decigrammes of arsenious acid some mould appeared on the thirteenth day; with four decigrammes, on the fifteenth day; and with one gramme, on the eighteenth day. With two grammes no decomposition was perceptible up to the sixtieth day.

Similar results were obtained in experiments with the pulp of beet-root. The decomposition of the pulp was completely prevented by a decigramme of corrosive sublimate; but a gramme and a half of either sulphate of iron, sulphate of copper, or sulphate of zinc, only retarded the decomposition of the same quantity of pulp for a few days. A gramme of iron liquor and six decigrammes of crude pyroligneous acid were found to be requisite for complete preservation.

Modes of Applying Preservative Agents.—Until lately, the only method commonly practiced of conveying a preservative material to the interior of a piece of wood consisted in steeping the wood in a solution of the substance, or else in exposing the wood to the vapor of the preserving body. A billet of wood placed on its end and covered with an aqueous solution, gradually absorbs a considerable quantity of the liquid merely by the force of capillary attraction, aided by the pressure of the liquid column. But the impregnation is affected very unequally in this manner, certain parts of the wood presenting far greater facilities for the transmission of the liquid than others. Those parts near the axis, where the tissue is denser than toward the surface, are scarcely at all penetrated by the solution.

The impregnation also takes place with extreme slowness; a piece of wood of about three feet three inches in length, and nine inches in diameter, continued to absorb water and increase in weight after having been submerged in water for ten months.

To obtain a more perfect and rapid impregnation of the wood, Dr. Boucherie* suggested the application of the aspirative force of the tree, the liquid being applied either to the base of the trunk or larger branches or to the roots. It is indifferent whether the tree is still standing or recently felled. By this force, the liquid is absorbed, in the course of a few days, to a height of eighty or a hundred feet, and even penetrates to the leaves.†

To impregnate a tree recently felled, the base of its trunk may be placed in a vat containing the solution of the preserving material, or else a bag of leather or sheet caoutchouc may be fastened water-tight around the base and put in communication by means of a pipe with a tank or cistern containing the solution. A poplar of about ninety feet in height, the base of which was placed in the month of September in a vat containing a solution of pyrolignite of iron of specific gravity 1.056, absorbed three hectolitres (very nearly 10-6 cubic feet) of the solution in the course of six days.

The time which may be allowed to elapse between the felling of the tree and the impregnation varies according to the nature of the tree and the season of the year. At the end of September, a pine, the trunk of which was fifteen inches and a half in diameter, became perfectly impregnated, when put in contact with the solution, forty-eight hours after being felled. In the month of June a plantain was also well penetrated after having been cut down for thirty-six hours. But the sooner the tree is put in contact with the liquid after being cut, the more energetic is the absorption. At the tenth day the aspirative force is hardly sensible.

As the tree should be maintained in a vertical position, its great weight may often become inconvenient to sustain; it is hence sometimes found more advantageous to operate on the tree before it is wholly detached from its roots.

To impregnate a standing tree, two deep notches may be made with a saw on each side of the trunk, into which two narrow wedges are to be inserted to support the tree; or an auger-hole of two or three inches in diameter may be bored through the center of the tree, and a horizontal cut made by a saw, right and left of the hole, enough of the outside being left to sustain the tree. A bag of tarred leather of sheet caoutchouc is then fastened around the trunk above and below the

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* *Annales de Chimie et de Physique*, t. lxxiv., 113.

† A patent was obtained by Mr. John Bethell for a process for impregnating wood, identical in most respects with that of Dr. Boucherie; the but-end of the recently felled tree being placed in a tank containing the solution, or else the solution is contained in a bag of water-proof cloth affixed to the end of the tree. The process was patented in July, 1838, which was previous to the publication of Dr. Boucherie's paper.

This method of impregnating wood has been favorably reported on by a commission of the French Academy, consisting of MM. Dumas, Boussingault, De Mirbel, Arago, Poncelet, Audouin, and Gambey; and extensive arrangements have been undertaken in France, by the Minister of Marine, for the application of the process to the preservation of wood for the French navy.

notches, and placed in communication, by a pipe, with a cistern containing the preserving solution; or else the solution may be contained in a basin of well-tempered clay, large enough to hold two or three gallons of liquid, made around the base of the trunk. To avoid waste of the liquid, the tree may be stripped of its superflucus branches before being submitted to the process. A terminal tuft, however, should always be allowed to remain.

The best season of the year for impregnating the tree, according to the experience of Dr. Boucherie, is the autumn. The impregnation is more difficult to effect in deciduous trees in spring than in winter or summer, but evergreens may be impregnated advantageously in winter.

Different kinds of liquids are not absorbed with equal facility; neutral solutions, for example, are absorbed more readily than either acid or alkaline. A plantain, the trunk of which was about twelve inches in diameter, absorbed in seven days two and a half hectolitres (very nearly 8.8 cubic feet) of a solution of chloride of calcium of specific gravity 1.1095 (about 22° Twaddell).

An objection to the process of impregnating trees by vital absorption is, that it can only be executed in the sap-season, which is limited to a few months in the year, and the cutting of the wood at this period is contrary to established practice.

A simpler and equally effective method, by which trees may be impregnated at all seasons of the year, has since been discovered by Dr. Boucherie, and also, independently, by Mr. W. H. Hyett, of Stroud, Gloucestershire, whose prize essay on the best solutions for impregnating trees to impart durability, incombustibility, etc., in the Transactions of the Highland Society,* contains a great deal of highly valuable information. The process consists simply in inverting the newly-felled tree, stripped of all superfluous branches, divided into convenient lengths, and, if necessary, squared, and applying the preserving liquid to the but-end of the tree, now the uppermost. The liquid may be contained either in a bag of impermeable cloth, adapted to the upper extremity, or in a cup hollowed out of the end of the tree. In most cases, the liquid quickly penetrates by the superior extremity, and the sap flows out at bottom almost immediately. The operation is terminated when the liquid which issues from the bottom of the piece is the same as that introduced at top. With some woods which contain a considerable quantity of gas in their pores, the flowing does not commence until the gas is expelled.

It is remarkable that the most porous woods are not those which are most easily penetrated. The poplar resists more than the yoke-elm and the beech; and the willow more than the pear-tree, the maple, and the plane. The ash, according to Mr. Hyett, completely resists the percolation of the liquid.

We are informed by Mr. Hyett that in the month of May every part of the trunks of large beech-trees, with the exception of three or four years' growth immediately around the pith, admitted the solution perfectly. At the same season, nine or ten inches in diameter of the heart-

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* Vol. VII. New Series, 1843, p. 535.

wood of Scotch fir-trees of about two feet in diameter resisted the liquids effectually.

The impregnation of timber which has been already seasoned or cut for some time is best attained by first exhausting all its pores of gas, and then introducing the liquid under a considerable pressure. This method was patented by Mr. John Bethell, in 1838.

The vessel in which the impregnation is effected, is an air-tight iron tank, of sufficient strength to withstand an internal pressure of two hundred pounds to the square inch. The circular wrought-iron boilers for high-pressure steam-engines, are well adapted for the purpose. The tank is fitted with an air-tight lid or door, and with a common steam-boiler safety-valve, and is connected by one pipe with an exhausting air-pump, and by another pipe with a pressure-pump, for forcing the liquid into the pores of the wood. When the wood is introduced into the tank, it is neatly covered with the preserving liquid, and the tank is exhausted of its air. After a short time, air is readmitted, and the liquid forced into the exhausted pores of the wood by the pressure-pump. In some cases, the penetration of the liquid requires to be assisted by applying a gentle heat to the outside of the tank; in others, the liquid enters readily after the exhaustion, without the assistance of pressure. The escape of air from the pores of the wood is expedited by placing the logs of wood in a perpendicular or slanting position, with their top ends above the surface of the liquid.

The apparatus used for injecting wood with a solution of chloride of zinc (Sir William Burnett's patent), at the Portsmouth Dockyard, consists of a cylinder of fifty-two feet in length, and six feet in diameter, capable of containing about nineteen or twenty loads of timber. It is fitted out with a set of exhausting-pumps, and a set of pressure-pumps, and has been proved up to two hundred pounds to the square inch. When the cylinder is loaded, the air is exhausted to 27.5 inches of mercury, and the liquid is introduced by a pipe in connection with a reservoir. Air is then readmitted and pressure applied, and as the wood absorbs the fluid, the cylinder is again exhausted and the pressure renewed, whereby the fluid is driven into every pore of the wood.*

Other Effects of the Impregnation of Wood with Foreign Substances.—Besides protection from decay, whether the wood be kept in a dry or humid state, the following effects may be produced by impregnation with certain foreign substances:

1. The increase of the hardness of the wood;
2. The preservation and increase of the flexibility, elasticity, and strength of the wood;
3. The reduction of the combustibility of the wood;
4. The prevention of the expansion and contraction of the wood, and the disjunctions which consequently occur in buildings through variations in the hygrometric condition of the atmosphere;
5. The application of various persistent colors and odors; and
6. The increase of the density of the wood.

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* *United Service Journal*, April, 1843.

1. From the effects of wood prepared with pyrolignite of iron on cutting tools, its hardness has been estimated by workmen at double that of the unprepared wood.

Of some specimens of beech impregnated by Mr. Hyett, a carpenter considered that with acetate of copper to be the hardest; those with common salt, yellow prussiate of potash, sulphate of copper, and corrosive sublimate, to be next in hardness; and those with pyrolignite of iron, sulphate of iron, and nitrate of soda next. Of some specimens of prepared larch, the hardest was that with pyrolignite of iron; the next in hardness were those with sulphate of iron and corrosive sublimate; and the next, those with acetate of copper, sulphate of copper, and prussiate of potash.

2. The flexibility and elasticity of wood may be preserved any length of time, according to Dr. Boucherie, by slightly impregnating the wood with some deliquescent substance, as a dilute solution of chloride of calcium or chloride of magnesium, by which a certain degree of humidity is always preserved in the wood, if exposed to the atmosphere. The solution preferred by Dr. Boucherie, as the most economical, is the mother-liquor of the salt-works, which contains small quantities of each of the above chlorides. The flexibility and elasticity are stated to be in proportion to the quantity of saline matter introduced. A plate of pine-wood charged with the mother-liquor, of three millimetres (.118 inch) in thickness, and sixty centimetres (23.6 inches) in length, was capable of being bent into three concentric circles without being broken, and when allowed, would again become straight. Its flexibility and elasticity were found to be undiminished after the lapse of eighteen months.

Wood which contains a small quantity of chloride of calcium or chloride of magnesium does not become dry by exposure to the sun in the middle of summer, and the little moisture lost by the wood during the day, is again absorbed at night. The adherence of paints and resinous varnishes does not seem to be affected by the application of these deliquescent substances.

The mother-liquor of salt-works would of itself tend to preserve the wood from decay; for security, however, it is recommended to add to the solution about a fifth part of the pyrolignite.

But Mr. Hyett has been led to conclude, from his experiments, that the flexibility of wood does not depend in all cases on the presence of moisture. Pieces of larch impregnated with acetate of copper and sulphate of copper, were found to be far more flexible than a piece impregnated with chloride of calcium. To ascertain the flexibility and strength of wood impregnated with different substances, three specimens of each tree were planed down to an inch square, till they passed as accurately as possible through a gauge, and cut to the length of four feet. The lengths were then placed horizontally in a frame so constructed that a weight suspended from the middle could not vary its position from the irregular bending of the piece; the ends were supported on props three feet apart. The weights were applied, and the deflection at the end of the interval, and the breaking point, were noted for each weight.

From the results of Mr. Hyett's experiments, it appears that the strength of the wood may be greatly increased or diminished by impregnation with foreign substances, and that it is most diminished by those substances which tend most to preserve or increase the flexibility of the wood. In the case of beech, the greatest deflection with a weight of one hundred and twelve pounds is produced by nitrate of soda, chloride of sodium, and sulphate of copper; but the pieces impregnated with nitrate of soda and chloride of sodium were the first to break, being unable to support a weight of one hundred and forty pounds; the piece with sulphate of copper broke next, under a weight of one hundred and sixty-one pounds. On the other hand, the piece of beech which showed least deflection with a given weight, namely that impregnated with prussiate of potash, was the strongest, and able to support the weight of two hundred and eighty-eight pounds.

It is to be observed that the flexibility and strength of larch and beech are not affected in a similar manner by the same substance, but the experiments on both kinds of wood lead to the conclusion that those prepared pieces which are deflected most by a given weight are those which are broken soonest on increasing the weight, and the reverse.

The preceding facts also lead to the important conclusion that the two different classes of trees, resinous and non-resinous, require very different treatment. In the beech, and probably all other non-resinous trees, prussiate of potash and pyrolignite of iron are the only agents which do not impair the strength of the wood in its natural state; while in the larch, prussiate of potash and sulphate of copper are the only substances which do not increase the strength of the wood. By far the greatest strength is imparted to beech by prussiate of potash; on larch, the same agent produces no alteration. Sulphate of iron diminishes the strength of beech, but considerably increases that of larch. Sulphate of copper and acetate of copper also diminish the strength of beech, but not that of larch.

For beech, the sulphates of iron and copper are not so beneficial as the corresponding acetates; this circumstance may be referred to the corrosive action which sulphuric acid exerts on woody fiber, especially on that of trees which do not contain any resin. Acetic acid exerts no such corrosive influence.

Corrosive sublimate produces much the same effect on larch as on beech. The pyrolignite of iron may be considered the best single material to be applied to both kinds of trees, but prussiate of potash is decidedly the best for beech, and chloride of calcinm the best for larch.

3. The reduction of the inflammability and combustibility of the wood is not the least important of the effects attainable by impregnation with saline substances, especially common salt, chloride of calcium, and chloride of magnesium. Not only is the inflammability of the wood diminished, but its combustion, when fairly commenced, is rendered difficult by the access of air to the carbonized wood being impeded by the thin film of fused alkaline or earthy salt.

Two huts, one built of prepared wood, and the other of unprepared, were set on fire at the same time by applying equal weights of the same lighted combustible matter. When the hut built of ordinary wood had become reduced to ashes, the interior surface of the other had hardly become carbonized (Dr. Boucherie). If perfectly dry, there appears to be little or no difference between the inflammability of prepared and unprepared wood.

4. The expansions and contractions which wood often experiences through changes in the hygrometric state of the atmosphere, and the consequent loosening of joints which thereby occurs, may also be prevented or diminished by impregnation with some deliquescent substance. According to Dr. Boucherie, wood containing a small amount of moisture is not subject to these changes in volume, and they may be entirely prevented by a little chloride of calcium or chloride of magnesium. A few large thin tables made of wood thus prepared underwent no change in form or size during a twelvemonth, while similar tables in the same situation, made of unprepared wood, became exceedingly warped. The addition of a little pyrolignite of iron to the deliquescent substance is also recommended, to insure durability.

5. The colors which are most easily applied to wood by the aspirative process are those which are produced by double decomposition between two substances in solution, the respective solutions being introduced into the wood consecutively. Thus, to produce a blue tint, the wood may be first impregnated with a solution of yellow prussiate of potash, and afterward with a solution of persulphate of iron; or the same solutions may be applied in the reverse order. The tint in this case is derived from Prussian blue. A black tint may be imparted by introducing successively a solution of sulphuret of sodium and a solution of acetate of lead, whereby sulphuret of lead is produced. Wood may also be stained black by introducing an infusion of galls and pyrolignite of iron. A green (Scheele's green) may be applied by means of acetate of copper and arsenious acid; a reddish brown (prussiate of copper), by sulphate of copper and yellow prussiate of potash; and a delicate yellow (chrome yellow), by acetate of lead and bichromate of potash. A solution of sulphate of copper, to which a slight excess of ammonia has been added, penetrates the wood with facility, and produces an agreeable bluish tint.

As the impregnation is not effected equally through the whole substance of the wood, the tinting is not uniform, but in veins and waves, which present an agreeable appearance when the wood is worked up and polished.

According to Mr. Hyett, different solutions do not penetrate the same parts with equal facility. In applying acetate of copper and prussiate of potash to larch, it was observed that the sap-wood was colored most, and the heart-wood least, when the acetate was introduced first. But when the prussiate was first applied, the heart-wood became most deeply colored. With sulphate or acetate of copper first, and prussiate of potash next, beech may be made to appear very much like mahogany. Iodide of lead and iodide of mercury cannot be applied to wood with advantage as coloring materials.

Pyrolignite of iron alone produces in beech a dark gray color, from the action of the tannin contained in the wood on the oxide of iron; but in larch and Scotch fir it merely darkens the natural color of the wood. Prussiate of potash alone produces a dingy green color. The tints of most of these coloring materials, especially of the prussiates of iron and copper, are improved by exposure to light; and the richest colors are obtained when the process is rapidly executed. (Mr. Hyett.)

Vegetable coloring matters do not easily penetrate the wood by the aspirative process, probably on account of the affinity of the woody fiber for the coloring principle, whereby the whole of the latter is abstracted from the solution by those parts of the wood with which it is brought at first into contact.

Essential oils and other odoriferous matters may be easily introduced into the wood in a state of solution in weak alcohol; and the odors thus imparted are considered to be as durable as those supplied by nature. Wood may also be impregnated with resinous substances in alcoholic solution, by which it may be rendered impervious to water, and far more inflammable.—*Parnell's "Applied Chemistry."*

USEFUL REFERENCE TABLES, Etc.

FOREIGN MONEYS OF ACCOUNT,

WITH THE PAR VALUE OF THE UNIT ESTABLISHED BY COMMERCIAL USAGE, EXPRESSED IN FEDERAL MONEY.

Austria.—60 kreutzers=1 florin; 1 florin (silver) is equal to	$0.485
Belgium.—100 cents=1 guilder or florin; 1 guilder (silver)	.40
The coinage of Belgium, in 1832, was made similar to that of France.	
Bencoolen.—8 satellers=1 soocoo; 4 soocoos=1 dollar or rial	1.10
Brazil.—1000 rees=1 milree=$.828. The silver coin, 1200 rees	.994
Bremen.—5 schwares=1 grote; 72 grotes=1 rix dollar (silver)	.787
British India.—12 pice=1 anna; 16 annas=1 Co. rupee (silver)	.445
The current (silver) rupee of Bengal, Bombay and Madras, is worth	.444
Buenos Ayres.—8 rials=1 dollar currency (fluctuating)	.98
Canton.—10 cash=1 candarine; 10 can.=1 mace; 10 mace=1 tael	1.48
The cash, which is made of copper and lead, is said to be the only money coined in China.	
Cape of Good Hope.—6 stivers=1 schilling; 8 schillings=1 rix dollar	.318
Ceylon.—4 pice=1 fanam; 12 fanams=1 rix dollar	.40
Cuba.—8 rials plate=1 dollar; 1 dollar	1.00
Colombia.—8 rials=1 dollar; 1 dollar (variable), mean value	1.00
Chili.—8 rials=1 dollar; 1 dollar (silver)	1.00
Denmark.—12 pfenings=1 skilling; 16 skillings=1 marc; 6 marcs=1 rigsbane or rix dollar (silver)	.52
Egypt.—3 aspers=1 para; 40 paras=1 piastre (silver)	.048
Greece.—100 lepta=1 drachmè; 1 drachmè (silver)	.166
Holland.—100 cents=1 florin or guilder; 1 florin (silver)	.40
Hamburg.—12 pfenings=1 schilling or sol; 16 schillings=1 marc Lubs; 3 marcs=1 rix dollar. The current marc (silver)=$.28; marc banco	.35
The term Lubs, signifies money of Lubec. The *marc currency* is the common coin; the *marc banco* is based upon certificates of deposit of bullion and jewelry in the bank of Hamburg.	
Invoices and accounts are sometimes made out in *pounds, schillings,* and *pence,* Flemish, whose subdivisions are like sterling money; the pound Flemish=7½ marcs banco.	
Japan.—10 candarines=1 mace; 10 mace=1 tael	.75
Java.—100 cents=1 florin; 1 florin, as in Netherlands	.40
Also 5 doits=1 stiver; 2 stivers=1 dubbel; 3 dub.=1 schilling; 4 schillings=1 florin	.40
Malta.—20 grani=1 taro; 12 tari=1 scudo; 2½ scudi=1 pezza	1.00
Mauritius.—In public accounts 100 cents=1 dollar	.968
In mercantile accounts 20 sols=1 livre; 10 livres=1 dollar.	
Manilla.—34 maravedis=1 rial; 8 rials=1 dollar, (Spanish)	1.00
Milan.—12 denari=1 soldo; 20 soldi=1 lira	.20
Mexico.—8 rials=1 dollar; 1 dollar	1.00
Monte Video.—100 centesimos=1 rial; 8 rials=1 dollar	.833
Naples.—10 grani=1 carlino; 10 carlini=1 ducat, (silver)	.80
Netherlands.—Accounts are kept throughout the kingdom in florins or guilders, and cents, as adopted in 1815. See Holland.	
New South Wales.—Accounts are kept in sterling money.	
Norway.—120 skillings=1 rix dollar specie (silver)	1.06
Papal States.—10 bajocchi=1 paolo; 10 paoli=1 scudo or crown	1.00
Peru.—8 rials=1 dollar (silver)	1.00
Portugal.—400 rees=1 cruzado; 1000 rees=1 milree or crown	1.12
Prussia.—12 pfenings=1 grosch (silver) 30 groschen=1 thaler or dollar	.69
Russia.—100 Copecks=1 rouble (silver)	.78
Sardinia.—100 centesimi=1 lira; 1 lira=1 franc, French	.180
Sweden.—12 rundysticks=1 skilling; 48 skillings=1 rix dollar, specie	1.06
Sicily.—20 grani=1 taro; 30 tari=1 oncia, (gold)	2.40
Spain.—2 maravedis=1 quinto; 16 quintos=1 rial of old plate	.10
20 rials vellon=1 Spanish dollar	1.00
The rial of old plate is not a coin, but it is the denomination in which invoices and exchanges are generally computed.	

St. Domingo—100 centimes=1 dollar; 1 dollar	$0.33¼
Tuscany.—12 denari di pezza=1 soldo di pezza; 2 soldi di pezza=1 pezza of 8 rials; 4 pezza, silver	.90
Turkey.—3 aspera=1 para; 40 paras=1 piastre, fluctuating	.05
Venice.—100 centesimi=1 lira; 1 lira=1 franc, French	.186
Formerly accounts were kept in ducats, lire, etc. 12 denari=1 soldo; 20 soldi=1 lira piccola; 6 1-5 lire piccole=1 ducat current; 8 lire pic.=1 ducat effective. The value of the the lire piccola is	.096
West Indies, British.—Accounts are kept in pounds, shillings, pence and farthings, of the same relative value as in England. The value of the pound varies very much in the different islands, and is in all cases less than the pound sterling.	

COINS AND MONEYS OF ACCOUNT MADE CURRENT IN THE UNITED STATES, BY ACT OF CONGRESS, AT THE RATES ANNEXED.

Pound sterling of Great Britain	$4.84
Pound of Canada, Nova Scotia	4.00
Do. New Brunswick and Newfoundland	4.00
Franc of France and Belgium	.188
Livre Tournois of France	.185
Florin of Netherlands	.40
Do. Southern States, Germany	.40
Guilder of Netherlands	.40
Real Vellon of Spain	.05
Do. Plate of Spain	.10
Milree of Portugal	1.12
Do. Azores	.83⅓
Marc Banco of Hamburg	.35
Thaler or Rix Dollar, Prussia and North States of Germany	.69
Rix Dollar of Bremen	$0.78¾
Specie Dollar of Denmark	1.05
Do. Sweden and Norway	1.06
Rouble, silver, of Russia	.75
Florin of Austria	.485
Lira of Lombardo, Venetian Kingdom	.16
Lira of Tuscany	.16
Do. of Sardinia	.186
Ducat of Naples	.80
Ounce of Sicily	2.40
Leghorn Livres	.16
Tael of China	1.48
Rupee, Company	.445
Do. of British India	.445
Pagoda of India	1.84

LEGAL INTEREST AND USURY LAWS.—*Alabama*, 8 per cent.—forfeit interest and usury. *Arkansas*, 6 per cent.—forfeit usury—by special contract as high as 10 per cent. *Connecticut*, 6 per cent.—forfeit whole debt. *Delaware*, 6 per cent.—forfeit whole debt. *Florida*, 8 per cent. —forfeit interest and usury. *Georgia*, 8 per cent.—forfeit three times usury. *Illinois*, 6 per cent.—forfeit three times usury and interest—by special contract as high as 12 per cent. *Indiana*, 6 per cent.—forfeit double the usury. *Iowa*, 7 per cent.—forfeit three times the usury—by special contract as high as 12 per cent. *Kentucky*, 6 per cent.—forfeit usury and costs. *Louisiana*, 5 per cent.—contract exacting usury void—banks allowed 6 per cent. *Maryland*, 6 per cent.—contract exacting usury void—8 per cent. allowed on tobacco contracts. *Maine*, 6 per cent.—forfeit entire debt. *Massachusetts*, 6 per cent.—forfeit three times the usury. *Michigan*, 7 per cent.—forfeit usury and one-fourth the debt. *Mississippi*, 8 per cent.—forfeit usury and cost—by contract as high as 10 per cent. *Missouri*, 6 per cent.—forfeit usury and interest—by contract as high as 10 per cent. *New York*, 7 per cent.—forfeit entire debt. *New Hampshire*, 6 per cent.—forfeit three times usury. *New Jersey*, 6 per cent.—forfeit entire debt. *North Carolina*, 6 per cent.—forfeit double usury. *Ohio*, 6 per cent.—contracts void. *Pennsylvania*, 6 per cent.—forfeit entire debt. *Rhode Island*, 6 per cent.—forfeit usury and interest. *South Carolina*, 7 per cent.—forfeit usury, interest and cost. *Tennessee*, 6 per cent.—contracts void. *Texas*, 10 per cent.—contracts void. *Vermont*, 6 per cent.—recovery in action with costs. *Virginia*, 6 per cent.—forfeit double the usury. *Wisconsin*, 7 per cent.—any rate agreed upon by the parties. *District of Columbia*, 6 per cent.—contracts void.

DIFFERENCE OF TIME

AT NEW YORK AND OTHER CAPITAL CITIES, AT NOON.

New York	12.00	N.
Buffalo	11.40	A.M.
Cincinnati	11.18	"
Chicago	11.7	"
St. Louis	10.55	"
San Francisco	8.45	"
New Orleans	10.56	"
Washington	11.48	"
Charleston	11.36	"
Havana	11.25	"
Boston	12.12	P.M.
Quebec	12.12	"
Portland	12.15	"
London	4.55	"
Paris	5.5	"
Rome	5.45	"
Constantinople	6.41	"
Vienna	6.00	"
St. Petersburg	6.57	"
Pekin, night	12.40	A.M

TABLE FOR BANKING AND EQUATION.

SHOWING THE NUMBER OF DAYS FROM ANY DATE IN ONE MONTH TO THE SAME DATE IN ANY OTHER MONTH.

Example: How many days from the 2d of February to the 2d of August? Look for February at the left hand, and August at the top—in the angle is 181. *In leap year, add one day if February is included.*

From / To	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
January	365	31	59	90	120	151	181	212	243	273	304	334
February	334	365	28	59	89	120	150	181	212	242	273	303
March	306	337	365	31	61	92	122	153	184	214	245	275
April	275	306	334	365	30	61	91	122	153	183	214	244
May	245	276	304	335	365	31	61	92	123	153	184	214
June	214	245	273	304	334	365	30	61	92	122	153	183
July	184	215	243	274	304	335	365	31	62	92	123	153
August	153	184	212	243	273	304	334	365	31	61	92	122
September	122	153	181	212	242	273	303	334	355	30	61	91
October	92	123	151	182	212	243	273	304	335	365	31	61
November	61	92	120	151	181	212	242	273	304	334	365	30
December	31	62	90	121	151	182	212	243	274	304	335	365

FOREIGN GOLD AND SILVER COINS,

AT THE RATES ESTABLISHED BY THE CUSTOM HOUSE AND COMMERCIAL USAGE.

Guinea,	English,	*gold,*	$5.00
Crown,	"	*silver,*	1.12
Shilling piece,	"	"	.23
Bank token,	"	"	.25
Florin of Basle,		"	.41
Moidore, Brazil,		*gold,*	4.80
Livre of Catalonia,		*silver,*	.53½
Florence Livre,		"	.15
Louis d'or, French,		*gold,*	4.56
Crown,	"	*silver,*	1.06
40 Francs,	"	*gold,*	7.66
5 Francs,	"	*silver,*	.93
Geneva Livre		"	.21
10 Thalers, German,		*gold.*	7.80
10 Pauls, Italy,		*silver,*	.97
Jamaica Pound, *nominal,*			3.00
Leghorn Dollar,		*silver,*	$0.90
Scudo of Malta,		"	.40
Doubloon, Mexico,		*gold,*	15.60
Livre of Neufchatel,		*silver,*	.26½
Half Joe, Portugal,		*gold,*	8.53
Florin, Prussia,		*silver,*	.22¾
Imperial Russia,		*gold,*	7.83
Rix Dollar, Rhenish,		*silver,*	.60¾
Rix Dollar of Saxony,		"	.69
Pistole, Spanish,		*gold,*	3.97
Rial	"	*silver,*	.12½
Cross Pistareen,		"	.16
Other Pistareens,		"	.18
Swiss Livre,		"	.27
Crown of Tuscany,		"	1.05
Turkish Piastre,		"	.05

INTEREST TABLE.

AT SIX PER CENT., IN DOLLARS AND CENTS, FROM $1 TO $10,000.

	1 day.	7 days.	15 days.	1 mo.	3 mos.	6 mos.	12 mos.
$	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
1	00	00	00¼	00½	01½	03	06
2	00	00¼	00½	01	03	06	12
3	00	00¼	00¾	01½	04½	09	18
4	00	00½	01	02	06	12	24
5	00	00½	01¼	02½	07½	15	30
6	00	00¾	01½	03	09	18	36
7	00	00¾	01¾	03½	10½	21	42
8	00	01	02	04	12	24	48
9	00	01	02¼	04½	13½	27	54
10	00	01¼	02½	05	15	30	60
20	00¼	02½	05	10	30	60	1 20
30	00½	03½	07½	15	45	90	1 80
40	00¾	04½	10	20	60	1 20	2 40
50	01	06	12½	25	75	1 50	3 00
100	01½	11¾	25	50	1 50	3 00	6 00
200	03	23½	50	1 00	3 00	6 00	12 00
300	05	35	75	1 50	4 50	9 00	18 00
400	07	46½	1 00	2 00	6 00	12 00	24 00
500	08	58½	1 25	2 50	7 50	15 00	30 00
1000	17	1 16½	2 50	5 00	15 00	30 00	60 00
2000	33	2 33½	5 00	10 00	30 00	60 00	120 00
3000	50	3 50	7 50	15 00	45 00	90 00	180 00
4000	67	4 66½	10 00	20 00	60 00	120 00	240 00
5000	83	5 83½	12 50	25 00	75 00	150 00	300 00
10000	1 67	11 66½	25 00	50 00	150 00	300 00	600 00

AT SEVEN PER CENT., IN DOLLARS AND CENTS, FROM $1 TO $10,000

	1 day.	7 days.	15 days.	1 mo.	3 mos.	6 mos.	12 mos.
$	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
1	00	00	00¼	00½	01¾	03½	07
2	00	00¼	00½	01¼	03½	07	14
3	00	00½	00¾	01¾	05¼	10½	21
4	00	00½	01	02⅛	07	14	28
5	00	00¾	01½	03	08¾	17½	35
6	00	00¾	01¾	03½	10½	21	42
7	00	01	02	04	12¼	24½	49
8	00	01	02¼	04⅔	14	28	56
9	00	01¼	02½	05¼	15¾	31½	63
10	00¼	01¼	03	05¾	17½	35	70
20	00⅔	02¾	06	11⅔	35	70	1 40
30	00½	04	09	17½	52½	1 05	2 10
40	00¾	05½	12	23⅓	70	1 40	2 80
50	01	06¾	15	29¼	87½	1 75	3 50
100	02	13½	29	58⅓	1 75	3 50	7 00
200	04	27¼	58	1 16⅔	3 50	7 00	14 00
300	06	40¾	87½	1 75	5 25	10 50	21 00
400	08	54½	1 17	2 33⅛	7 00	14 00	28 00
500	10	68	1 46	2 91⅔	8 75	17 50	35 00
1000	19½	1 36	2 92	5 83⅛	17 50	35 00	70 00
2000	39	2 72¼	5 83	11 66⅔	35 00	70 00	140 00
3000	58	4 08¼	8 75	17 50	52 50	105 00	210 00
4000	78	5 44½	11 67	23 33⅓	70 00	140 00	280 00
5000	97	6 80½	14 58	29 16⅔	87 50	175 00	350 00
10000	1 94	13 61	29 17	58 33	175 00	350 00	700 00

TIME OF HOLDING ELECTIONS

IN THE DIFFERENT STATES, THE QUALIFICATION OF VOTERS, THE LENGTH OF TERM, AND SALARIES OF GOVERNORS.*

States.	Time of Election.	Qualification of Voters.	GOVERNORS. How chosen.	GOVERNORS. Term.	GOVERNORS. Salaries.	Elect'rs.	Date of Presidential Elections.
Alabama	1st Monday in August.	Three months' residence.	By the people.	2 years.	$2000	9	The first Tuesday after the first Monday in November.
Arkansas	1st Monday in October.	Six " "	"	4 "	2000	3	
Connecticut	1st Monday in April.	" " "	"	1 "	1100	6	
Delaware	2d Tuesday in Nov.	One year's "	"	4 "	1333 33	3	
Florida	1st Monday in October.	" "	"	4 "	2500	3	
Georgia	1st Monday in October.	Six months' "	"	1 "	3000	10	
Indiana........	1st Monday in August.	One year's "	"	3 "	1000	12	
Illinois........	" "	Six months' "	"	4 "	1000	9	
Iowa..........	" "	One year's "	"	4 "	1000	4	
Kentucky......	" "	" "	"	4 "	2500	12	
Louisiana......	1st Monday in July.	" "	"	4 "	7500	6	
Maine	2d Monday in Sept.	Three months' "	"	1 "	1500	9	
Massachusetts...	2d Monday in Nov.	Residence and pay tax.	"	1 "	3666 66	12	
Maryland......	1st Monday in October.	One year's residence.	"	3 "	2666 66	8	
Mississippi	1st Monday in Nov.	Four months' "	"	2 "	2500	6	
Missouri.......	1st Monday in August.	Three " "	"	4 "	1500	7	
Michigan.......	1st Monday in October.	Six " "	"	2 "	2000	5	
New Hampshire.	2d Tuesday in March.	Residence and pay tax.	"	1 "	1000	6	
New York.....	1st Monday in Nov.	Six months' residence.	"	2 "	4000	36	
New Jersey....	2d Tuesday in October.	One year's "	Legislature.	1 "	2000	7	
North Carolina..	In August.	Freehold, residence and tax.	By the people.	2 "	2000	11	
Ohio..........	2d Tuesday in October.	One year's residence.	"	2 "	1200	23	
Pennsylvania...	" "	One year's residence, and ten days in the district.	"	3 "	4000	26	
Rhode Island	Gov. and Sen. in April. Rep. in April & August.		"	1 "	400	4	
South Carolina..	2d Monday in October.	Six months' residence.	Legislature.	2 "	2500	9	
Tennessee......	1st Thursday in August.	" "	By the people.	2 "	2000	13	
Texas.........	1st Monday in Nov.	One year's residence.	"	2 "	2000	4	
Virginia.......	In April.	One year, housekeeper, &c.	Legislature.	3 "	3333 33	17	
Vermont.......	1st Tuesday in Sept.	One year and allegiance.	By the people.	1 "	750	6	
Wisconsin	Tues. aft. 1st Mon. in Nov.	One year's residence.	"	2 "	1250	4	
California......	Tues. aft. 1st Mon in Sep.		"		10000		

* "World in a Pocket-Book."

AGRICULTURAL PRODUCTS OF THE UNITED STATES IN 1850.

Horses	4,336,719	Butter, pounds	313,345,306
Mules and asses	559,331	Cheese, "	105,535,893
Horses, asses and mules	4,896,050	Butter and cheese	418,881,199
Milch cows	6,385,094	Pease and beans, bushels	9,219,901
Working oxen	1,700,744	Market gardens	$5,280,030
Other cattle	10,293,069	Nursery products	....
Total neat cattle	18,378,907	Orchard	$7,723,186
Sheep	21,723,220	Beeswax and honey, lbs	14,853,790
Swine	30,354,213	Poultry	....
Value of live stock	$544,180,516	Family goods	$27,493,644
Value of animals slaughtered	111,703,142	Cords of wood	....
Wheat, bushels	100,485,944	Flaxseed, bushels	562,312
Rye, "	14,188,813	Flax, pounds	7,709,676
Oats, "	146,584,179	Dew-rotted hemp, tons	33,193
Indian corn, bushels	592,071,104	Water " " "	1,678
Irish potatoes, "	65,797,893	Maple sugar, pounds	34,253,436
Sweet potatoes "	38,268,148	Sugar-cane, hogsheads	237.133
Total, "	104,066,044	Molasses, gallons	12,700,991
Barley, "	5,167,015	Cotton, bales	2,445,793
Buckwheat, "	8,956,912	Rice, pounds	215,313,497
Hay, tons	13,838,642	Tobacco "	199,752,655
Hops, pounds	3,497,029	Wool "	52,516,959
Clover-seed, bushels	468,978	Silk cocoons, pounds	10,843
Other grass-seeds, bushels	416,831	Wine, gallons	221,249

Agriculture of the United States.

Farms and plantations in the United States, in 1850	1,449,075
Acres improved	113,032,314
Acres unimproved	180,528,000
Average number of acres in a farm	203
Cash value of farms	$3,291,575,426
Value of farming implements and machinery	$151,587,638
Average value of farms	$2,258

ESTIMATE FOR 1855.

The following is an estimate of the agricultural products of the United States for 1855:

Vegetable Products.

		Price.	Amount.
Indian corn, bushels	600,000,000	$0 60	$360,300,000
Wheat	165,000.000	1 50	247,500,000
Rye	14,000,000	1 00	14,000,000
Barley	6,600,000	0 90	5,940,000
Oats	170,000,000	0 40	68,000,000
Buckwheat	10,000,000	0 50	5,000,000
Potatoes, all sorts	110,000,000	0 37½	41,250,000
Flax-seed	58,000	1 25	72,500
Beans and Pease	9,500,000	2 00	19,000,000
Clover and grass-seed	1,000,000	3 00	3,000,000
Rice, lbs	250,000,000	0 04	10,000,000
Sugar (cane)	505,000,000	0 07	53,350,000
Sugar (maple)	34,000,000	0 08	2,720,000
Molasses, gallons	14,000,000	0 30	4,200,000
Wine	2,500,000	1 00	2,500,000
Hops, lbs.	3,500,000	0 15	525,000
Orchard products	.....	....	25,000,000
Garden products	......	....	50,000,000
Tobacco	190,000,000	0 10	19,000,000
Cotton	1,700,000,000	0 08	136,000,000
Hemp, tons	34,500	100 00	3,450,000
Flax, lbs	800,000	0 10	80,000
Hay and fodder, tons	16,000,000	10 00	160,000,000
Pasturage	......	....	143,000,000

Domestic Animals and Animal Products.

		Each.	Amount.
Horned cattle	21,000,000	$20 00	$420,000,000
Horses, asses and mules	5,100,000	60 00	306,600,000
Sheep	23,500,000	2 00	47,000,000
Swine	32,000,000	5 00	160,000,000
Poultry	....	....	20,000,000
Slaughtered animals	....	....	200,000,000
Butter and cheese, lbs	500,000,000	0 15	75,000,000
Milk, gallons	1,000,000,000	0 10	100,000,000
Wool, lbs	50,000,000	0 35	21,000,000
Beeswax and honey	16,000,000	0 15	2,400,000
Silk cocoons	5,000	1 00	5,000

The agricultural products of the United States for 1857, are estimated at $2,000,000,000.

MANUFACTURING AND MINING OF THE UNITED STATES, ACCORDING TO THE CENSUS OF 1850.

Establishments	121,855
Capital	$527,209,193
Raw material used	554,655,038
Males employed	719,479
Females	225,512
Annual wages	226,736,377
Annual product	1,013,326,463
Cotton employs 94,000 people, and the manufactures produced are valued at	61,869,184
Woolens employ 40,000 hands, and produce fabrics worth	43,207,545
Pig iron, 51,000 hands, annual products	12,748,727
Iron castings, 24,000 hands, annual products	25,108,155
Wrought iron, 16,300 hands, annual products	22,629,271

All the manufactures have greatly increased since the census

AGRICULTURE OF FOUR NATIONS.

	Great Britain.	France.	United States.	Russia.
Acres of land in cultivation	22,000,000	72,000,000	118,000,000	243,000,000
Bushels of wheat av. per annum	336,000,000	576,000,000	100,000,000	1,400,000,000
Number of horned cattle	18,000,000	9,000,000	*19,000,000	25,000,000
Number of horses	1,600,000	2,818,000	5,000,000	18,000,000
Number of sheep and goats	50,000,000	32,000,000	22,000,000	50,000,000
Number of swine	19,000,000	5,000,000	30,000,000	12,000,000
Population of each country	27,000,000	36,000,000	23,000,000	68,000,000

* Nearly.

THE WEALTH OF THE UNION IN 1856.

The following interesting official table has been communicated by the Secretary of the Treasury, to accompany his annual report of the finances:

Real and Personal Wealth of the United States, 1856.

States.	Population.	Value of Property.
Alabama	835,192	$270,233,027
Arkansas	253,117	64,240,726
California	335,000	165,000,000
Connecticut	401,292	203,759,831
Delaware	97,295	30,466,924
Florida	110,725	49,461,461
Georgia	935,090	500,000,000
Illinois	1,242,917	333,237,474
Indiana	1,149,606	301,858,474
Iowa	325,013	110,000,000
Kentucky	1,086,587	411,000,198
Louisiana	600,387	270,425,000
Maine	623,862	131,128,186
Maryland	639,580	261,243,660
Massachusetts	1,133,123	597,936,995
Michigan	509,374	116,593,580
Mississippi	671,649	251,525,000
Missouri	831,215	223,948,731
New Hampshire	324,701	103,804,326
New Jersey	569,499	179,750,000
New York	3,470,059	1,364,154,625
North Carolina	921,851	239,603,372
Ohio	2,215,750	860,877,354
Pennsylvania	2,542,960	1,031,731,304
Rhode Island	166,927	91,699,850
South Carolina	705,661	303,434,240
Tennessee	1,092,470	321,771,810
Texas	500,000	240,000,000
Vermont	325,206	91,165,680
Virginia	1,512,593	530,994,897
Wisconsin	552,109	87,500,000
District of Columbia	59,000	25,568,703
Minnesota	65,000	20,000,000
New Mexico	83,500	7,550,000
Oregon	36,000	7,775,000
Washington	5,500	1,650,000
Utah	39,000	4,250,000
Kansas	11,000	2.350,000
Nebraska	4,500	1,235,644
Total	26,964,312	$9,817,611,072
Add for property not valued, for under valuations, and for the rise in the value of property since 1850, the sum of		$1,500,000,000
Total wealth of the United States in 1856,		$11,317,611,072

WHERE OUR DOMESTIC EXPORTS GO—1856.

To British Dominions	$195,791,886	Turkey	$1,404,768
French	42,594,963	Africa	1,731,011
Spanish (Cuba $7,199,035, included)	15,900,572	Hayti	1,862,823
Russian	600,153	San Domingo	74,886
Prussian	70,367	Mexico	2,464,942
Swedish	1,932,347	Central America	347,265
Danish	1,013,250	New Granada	1,444,843
Hamburg	3,268,473	Venezuela	1,643,621
Bremen	9,889,627	Brazil	4,853,125
Other German ports	30,885	Uruguay	517,849
Holland	4,258,869	Buenos Ayres	1,013,112
Belgium	5,346,386	Chili	1,591,354
Portugal	4,439,127	Peru	2,159,232
Sardinia	2,143,977	Ecuador	27,374
Tuscany	425,595	Sandwich Islands	793,058
Two Sicilies	303,576	Japan	4,009
Papal States	31,428	China	2,048,244
Austria	2,238,783	Whale Fisheries	320,045
Total			$310,586,330
Foreign goods re-exported			16,378,578
Total exports of the fiscal year			$326,964,908

THE FOREIGN STATES WE BUY FROM—1856.

British Dominions	$154,056,749	Austria	$476,541
France and her Islands	49,240,803	Turkey	741,871
Spain and her Islands, (Cuba $23,565,592, included)	33,482,700	Egypt	51,979
Brazil	19,262,657	Africa	1,165,857
China	10,454,436	Hayti	1,924,259
Russia	330,581	San Domingo	60,196
Prussia	161,169	Mexico	3,568,681
Sweden	881,437	Central America	246,853
Denmark	226,158	New Granada	2,325,019
Hamburg	2,611,932	Venezuela	4,202,692
Bremen	11,846,530	Uruguay	381,036
Holland	4,615,436	Buenos Ayres	2,322,161
Belgium	3,106,511	Chili	2,467,819
Portugal	366,342	Peru	217,759
Sardinia	367,179	Ecuador	84,804
Tuscany	1,596,801	Sandwich Islands	249,704
Papal States	39,064	Japan	16,821
Two Sicilies	1,468,526	Whale Fisheries	58,067
		Uncertain places	882
Total imports, fiscal year			$311,639,942

ARMY AND NAVY OF THE UNITED STATES.

The army of the United States, 1857, in officers and men, numbered 15,000—the militia, 2,421,163

POPULATION OF THE WORLD.

	Area in square miles.	Population.	Pop. to sq. mile.
America	14,491,000	55,071,000	4
Europe	3,757,950	265,395,000	70
Asia	16,313,000	455,562,000	28
Africa	10,936,000	61,604,000	5
Oceanica	4,500,000	23,445,000	5
	49,997,000	861,077,000	17

CIVIL AND POLITICAL STATISTICS OF THE PRINCIPAL CIVILIZED STATES.

States.	Number of Army.	Vessels in Navy.	No. of Guns in Navy.	Amount of Public Debt.
Russia	784,982	175	7,000	$733,000,000
Great Britain and Ireland	138,769	678	18,000	3,760,000,000
France	502,715	328	8,000	1,330,000,000
Denmark	24,823	33	1,120	80,000,000
Netherlands	50,000	125	2,500	731,000,000
Belgium	94,900	5	36	165,000,000
Austria	414,000	65	510	479,160,000
Prussia	137,000	47	114	180,000,000
Bavaria	53,500	....	....	73,600,000
Sweden and Norway	62,970	306	2,960	1,500,000
Spain	160,000	50	721	1,300,000,000
Portugal	38,000	36	700	160,000,000
Sardinia	38,000	60	900	120,000,000
Tuscany	5,500	5	434	....
States of the Church	17,000	3	....	34,000,000
Naples	48,882	60	....	16,000,000
Greece	4,060	33	....	10,000,000
Turkey	200,000	74	4,000	36,000,000
Brazil	17,095	67	350	68,000,000
Mexico	19,600	10	....	102,550,000
United States	15,000	75	2,045	52,312,000

DEBTS OF THE INDIVIDUAL STATES IN 1857.

States.	Absolute Debt.	States.	Absolute Debt.
Maine	$963,930	Alabama	$5,888,134
New Hampshire	None.	Mississippi	7,271,707
Vermont	None.	Louisiana	12,459,350
Massachusetts	6,813,555	Texas	None.
Rhode Island	382,335	Arkansas	3,319,596
Connecticut	None.	Tennessee	8,744,857
New York	26,234,898	Kentucky	5,993,577
New Jersey	95,000	Ohio	16,273,427
Pennsylvania	40,196,994	Michigan	2,347,470
Delaware	None.	Indiana	7,338,473
Maryland	14,949,588	Illinois	13,994,615
Virginia	29,899,512	Missouri	19,602,000
North Carolina	5,209,848	Iowa	79,79[illegible]
South Carolina	5,287,156	Wisconsin	100,000
Georgia	2,644,222	California	1,812,502
Florida	None.		
Total			238,902,542

EXPECTATION OF LIFE

AT EVERY AGE, BY THE LAW OF MORTALITY IN ENGLAND AND THE UNITED STATES.

Age.	Expectat'n.	Age.	Expectat'n.	Age.	Expectat'n.	Age.	Expectat'n.
0	38.72	26	37.14	52	19.68	78	6.12
1	44.68	27	36.41	53	18.97	79	5.80
2	47.55	28	35.69	54	18.28	80	5.51
3	49.82	29	35.00	55	17.58	81	5.21
4	50.76	30	34.34	56	16.89	82	4.93
5	51.25	31	33.68	57	16.21	83	4.65
6	51.17	32	33.03	58	15.55	84	4.39
7	50.80	33	32.36	59	14.92	85	4.12
8	50.24	34	31.68	60	14.34	86	3.90
9	49.57	35	31.00	61	13.82	87	3.71
10	48.82	36	30.32	62	13.31	88	3.59
11	48.04	37	29.64	63	12.81	89	3.47
12	47.27	38	28.96	64	12.30	90	3.28
13	46.51	39	28.28	65	11.79	91	3.26
14	45,75	40	27.61	66	11.27	92	3.37
15	45.00	41	26.97	67	10.75	93	3.48
16	44,27	42	26.34	68	10.23	94	3.53
17	43.57	43	25.71	69	9.70	95	3.53
18	42.87	44	25.09	70	9.18	96	3.46
19	42.17	45	24.46	71	8.65	97	3.28
20	41.46	46	23.82	72	8 16	98	3.07
21	40.75	47	23.17	73	7.72	99	2.77
22	40.04	48	22.50	74	7.33	100	2.28
23	39.31	49	21.81	75	7.01	101	1.79
24	38.59	50	21.11	76	6.69	102	1.30
25	37.86	51	20.39	77	6.40	103	0.83

The above table coincides, with singular accuracy, with the whole experience of one of the oldest and most extensive life assurance establishments in London—The Equitable; the expectation of life in no instance differing by one year, and in some instances coinciding within the hundredth part of a year.

Dr. Caspar, of Berlin, says, that the longevity of females is greater than that of males. He shows that the medium or average duration of life has increased within the last century.

Another important agent or influence on the probable duration of life is marriage. It is proved by Caspar, that the married state is favorable to longevity, and especially in reference to the male sex. He adds;

"The medium duration of life, at the present time, is, in Russia about twenty-one years, in Prussia twenty-nine, in Switzerland thirty-four, in France thirty-six, in Belgium thirty-six, and in England thirty-eight years."

In reference to the influence of professions or occupations on life, it seems that ecclesiastics are, on the whole, the longest, and medical men the shortest, livers; military men are nearly between the two extremes, but vet, proportionally, they, more frequently than others, reach verv advanced years.

The mortality is very generally greater in manufacturing than in agricultural districts.

The mortality among the poor is always greater than among the wealthier classes.

NUTRIMENT IN VARIOUS SUBSTANCES.

Wheat contains 85 per cent., rice 90, rye 80, barley 83, beans 89 to 92, pease 93, meat, average 35, potatoes 25, beets 14, carrots 14, bread 80.

WAGES OF LABOR IN VARIOUS COUNTRIES.

The following summary of the wages paid to foreign labor is the strongest commentary that can be made, upon the beneficent results which have flowed from the discovery and settlement of the western continent, and from the free institutions established upon it.

England.—*Wages of Labor.*—In ordinary times the poor laborer gets from $3 to $4 per week. In seasons of distress he gets but $2.50. In each case he is obliged to find his own board and lodging. Mechanics $1 to $1.50 per day. *Currency.*—England, like this country, is a paper and specie money country, the former predominating.

France.—*Wages.*—The laborer averages, the year through, 16 to 20 cents per day. *Currency.*—Specie and paper—the former predominating.

Corsica.—*Wages.*—The male laborer gets 24 cents a day, and the female 11 cents. *Currency.*—In Corsica wages are paid in specie.

Prussia.—*Wages.*—The male laborer gets from 18 to 25 cents per day, for the longest days, and about one-third less for the shortest days. The female gets a little more than half as much. *Currency.*—Paper and specie, the latter predominating.

Germany.—*Wages.*—The male laborer gets from 15 to 25 cents per day. The female gets about three-fifths as much. *Currency.*—The circulation of Germany is a mixture of paper and specie, and at times the former has been greatly depreciated.

Holland and Belgium.—*Wages.*—A regular farm male servant gets from $26 to $32 per annum. A female servant is paid half as much. Laborers get from 20 to 30 stivers in the summer, and from 14 to 16 in the winter. *Currency.*—The circulation of Holland and Belgium is a mixture of paper and specie, the latter greatly predominating.

Austrian Provinces.—*Wages.*—Trieste—a field laborer gets one shilling sterling (22 cents) per day, one half of which is deducted if board and lodging are found. Milan—the head man gets from one to two livres per day, in harvest time; half that amount at other times. Genoa—laborers receive from 5d. to 8d. per day, besides their diet. Leghorn—the day laborer gets 8d. a day and food in summer. *Currency.*—The circulation of Austria is half paper and half specie.

Russia.—*Wages.*—There is no such thing as wages paid to laborers in Russia, the laborer being bought and sold with the soil on which he lives. He is a mere slave. *Currency.*—The circulation of Russia is almost entirely paper, which is depreciated two-thirds in value, one specie rouble being worth three paper roubles.

Cuba.—We have no authentic information from this country. It is said, however, that wages are high, the slave earning $1.50 per day. Mechanic labor is $3 per day. *Currency.*—Entirely specie.

In New York and Philadelphia the rates are—carpenters, $1.75 to $2.25; bricklayers, $1.75 to $2.25; laborers, $1; mechanics generally, $1.50 to $2 per day.

In the Southern and Western States, the rates of wages are from 50 to 100 per cent. higher than the above.

ANNUAL SALARIES OF GOVERNMENT OFFICERS.

President, elected by the people, for four years	$25,000
Vice-President	5,000
The Cabinet, seven in number, each	6,000
Chief officers of departments, 31 in number, receive from (each)	1500 to 3,000
Senators, (62) elected for six years, one-third going out every two years, receive, per day	8
Members of the House of Representatives (242) are elected for two years, and receive, per day	8
Ambassadors	14,000
Chargés d'Affaires	4,500

GUNPOWDER.

RELATIVE PROPORTIONS OF CHARCOAL, NITRE, AND SULPHUR, CONTAINED IN SOME OF THE MOST CELEBRATED GUNPOWDERS.

Authorities, or place of manufacture.	Nitre.	Charcoal.	Sulphur.
English: Royal Mills, Waltham Abbey	75	15	10
Sporting powder, (Marsh)	78	12	10
do. (Marsh)	76	15	9
do. Hall, Dartford, (Ure)	76.2	14	9
do. Pigou & Wilks, (Ure)	77.4	13.5	8.5
do. Curtis & Harvey, (Ure)	76.7	12.5	9
Battle powder, (Ure)	77	13.5	8
Miners' do. (Marsh)	65	15	20
Common do. (Marsh)	75	12.5	12.5
French: Government powder	75	12.5	12.5
Sporting do.	78	12	10
Miners' do.	65	15	20
Gunpowder of Bale	76	14	10
do. of Grenelle	76	12	12
do. of M. Guyton Morveau	76	15	9
do. do.	77.33	13.44	9.24
do. of M. Riffault	77.5	15	7.5
United States Government powder	75	12.5	12.5
Russia do.	73.78	13.59	12.63
Prussia do.	75	13.5	11.5
Austria do.	72	17	16
Spain do.	76.47	10.78	12.75
Sweden do.	76	15	9
Switzerland do.	76	14	10
China do.	75	14.4	9.9
Theoretical proportion for the best gunpowder	75	13.23	11.77

CONGELATION.

Congelation (from *congelo*, to freeze,) is the conversion of a liquid into a solid state, by the action of cold.

The production of an extreme degree of cold is often of the utmost importance in chemical operations, and an easy method of doing so is consequently a desideratum. The means hitherto adopted for this purpose have either depended upon the sudden liqnefaction of solids, or the abstraction of heat by rapid evaporation. The loss of sensible heat, by the first method, is the basis of the various processes of producing cold by what are commonly called freezing mixtures, all of which act upon the principle of liquefying solid substances without supplying heat. The caloric of liquidity being in these cases derived from that previously existing in the solid itself in a sensible state, the temperature must necessarily fall. The degree of cold produced depends upon the quantity of heat which is thus diffused through a larger mass, or which, as it were, disappears, and this is dependent on the quantity of solid matter liquefied, and the rapidity of the liquefaction. Saline compounds are the substances most frequently employed, and those which have the greatest affinity for water, and thus liquefy the most rapidly, produce the greatest degree of cold. Thus it is, that chloride of calcium and nitrate of ammonia, when dry and in fine powder, if suddenly mixed with water, produce extreme cold. The latter, suddenly mixed with an equal weight of water at 50°, will sink the thermometer to —4°, or 28° below the freezing point. The most common and convenient freezing mixture, when snow can be procured, is formed by mixing two parts of that substance with one part of sea-salt. This will sink the thermometer to —5°, or 37° below the freezing point of water. Equal parts of these substances produce a degree of cold marked by the zero of Fahrenheit's thermometer, and is the standard taken for graduating that instrument. Mr. Walker, a gentleman who fully investigated this subject, recommends the following proportions for the production of extreme cold.

Collective View of all the Frigorific Mixtures contained in Mr. Walker's Publication, 1808.

I. FRIGORIFIC MIXTURES, COMPOSED OF ICE, WITH CHEMICAL SALTS AND ACIDS.

Mixtures.		Thermometer sinks.		Degree of cold produced.
Snow or pounded ice,	2 parts	From any temperature	to —5°	*
Muriate of soda	1 "			
Snow or pounded ice	5 "		to —12°	*
Muriate of soda	2 "			
Mnriate of ammonia	1 "			
Snow or pounded ice	24 "		to —18°	*
Muriate of soda	10 "			
Muriate of ammonia	5 "			
Nitrate of potash	5 "			
Snow or pounded ice	12 "		to —25°	*
Muriate of soda	5 "			
Nitrate of ammonia	5 "			

Mixtures.		Thermometer sinks.	Degree of cold produced.
Snow	3 parts	From +32° to —23°	55°
Diluted sulphuric acid .	2 "		
Snow	8 "	From +32° to —27°	59
Muriatic acid (concentrated)	5 "		
Snow	7 "	From +32° to —30°	62
Concentrated nitrous acid.	4 "		
Snow	4 "	From +32° to —40°	72
Muriate of lime . .	5 "		
Snow	2 "	From +32° to —50°	82
Crystallized muriate of lime	3 "		
Snow	3 "	From +32° to —51°	83
Potash	4 "		

N. B. The reason for the omissions in the last column of this table is, the thermometer sinking in these mixtures to the degree mentioned in the preceding column, and never lower, whatever may be the temperature of the materials at mixing.

II. FRIGORIFIC MIXTURES, HAVING THE POWER OF GENERATING OR CREATING COLD, WITHOUT THE AID OF ICE, SUFFICIENT FOR ALL USEFUL AND PHILOSOPHICAL PURPOSES, IN ANY PART OF THE WORLD AT ANY SEASON.

Mixtures.		Thermometer sinks.	Degree of cold produced.
Muriate of ammonia . .	5 parts	From +50° to +10°	40°
Nitrate of potash . .	5 "		
Water	16 "		
Muriate of ammonia .	5 "	From +50° to +4°	46
Nitrate of potash . .	5 "		
Sulphate of soda . .	8 "		
Water	16 "		
Nitrate of ammonia .	1 "	From +50° to +4°	46
Water	1 "		
Nitrate of ammonia .	1 "	From +50° to —7°	57
Carbonate of soda . .	1 "		
Water	1 "		
Sulphate of soda . .	3 "	From +50° to —3°	53
Diluted nitrous acid .	2 "		
Sulphate of soda . .	6 "	From +50° to —10°	60
Muriate of ammonia .	4 "		
Nitrate of potash . .	2 "		
Diluted nitrous acid .	4 "		
Sulphate of soda . .	6 "	From +50° to —14°	64
Nitrate of ammonia .	5 "		
Diluted nitrous acid . .	4 "		
Phosphate of soda. .	9 "	From +50° to —12°	62
Diluted nitrous acid . .	4 "		
Phosphate of soda. .	9 "	From +50° to —21°	71
Nitrate of ammonia . .	6 "		
Diluted nitrous acid	4 "		
Sulphate of soda . .	8 "	From +50° to 0°	50
Muriatic acid . .	5 "		
Sulphate of soda . .	5 "	From +50° to +3°	47
Diluted sulphuric acid .	4 "		

III. FRIGORIFIC MIXTURES SELECTED FROM THE FOREGOING TABLES, AND COMBINED SO AS TO INCREASE OR EXTEND COLD TO THE EXTREMEST DEGREES.

Mixtures.		Thermometer sinks.	Degree of cold produced.
Phosphate of soda Nitrate of ammonia Diluted nitrous acid	5 parts 3 " 4 "	From 0° to —34°	34°
Phosphate of soda Nitrate of ammonia Diluted mixed acids	3 " 2 " 4 "	From —34° to —50°	16
Snow Diluted nitrous acid	3 " 2 "	From 0° to —46°	46
Snow Diluted sulphuric acid Diluted nitrous acid	8 " 3 " 3 "	From —10° to —56°	46
Snow Diluted sulphuric acid	1 " 1 "	From —20° to —60°	40
Snow Muriate of lime	3 " 4 "	From +20° to +48°	68
Snow Muriate of lime	3 " 4 "	From +10° to +54°	64
Snow Muriate of lime	2 " 3 "	From —15° to —68°	53
Snow Crystallized muriate of lime	1 " 2 "	From 0° to —66°	66
Snow Crystallized muriate of lime	1 " 3 "	From —40° to —73°	33
Snow Diluted sulphuric acid	8 " 10 "	From —68° to —91°	23

Remarks. The above artificial processes for the production of cold are more effective when the ingredients are first cooled by immersion in other freezing mixtures. In this way Mr. Walker succeeded in producing a cold equal to 100° below the zero of Fahrenheit, or 132° below the freezing point of water.

The materials in the first column are to be cooled, previously to mixing, to the temperature required, by mixtures taken from either of the preceding tables.

BUSINESS FORMS, AND THE LEGAL PRINCIPLES APPLICABLE THERETO.

Those for whom this work is intended, will, it is believed, often find the following business forms, and the legal principles applying to them convenient and valuable.*

NOTES.

No precise form of words is necessary to constitute a valid promissory note. A promise to account for a certain sum, or an acknowledgment of indebtedness for value received, is sufficient. Any thing valuable is a good consideration for the promise, or acknowledgment.

A note commencing, "I promise to pay, &c.," and signed by two parties, is joint and several; so also, where one signs a note as surety for another.

A promissory note given by an infant, even for necessaries, is void.

A guaranty of the collection of a promissory note, without expressing any consideration, is void; otherwise, with a guaranty of payment, if there be in fact a new and distinct consideration, though not expressed.

A general guaranty of payment, upon a note payable to bearer, as, "I guaranty the payment of the within note," is, in law, a general endorsement of the note, and any subsequent holder may recover of the guarantor, on proof of demand and notice.

A party may become an endorser of a bill, or note, by any mark, whether his initials, or other figure or sign, if it be substituted for his name, and he intend to be bound by it.

The endorsement of a bill, or note in blank, is a mere agreement to pay, on the usual conditions of demand and notice.

If a note be made payable to the order of several persons, not copartners, it must be endorsed by each person. If an endorser wishes to free himself from all liability, the words "without recourse," should be written before his name.

Forms of Notes.

Promissory Note, Negotiable.†

$100. Thirty days after date, I promise to pay C. D., or bearer, [*or*, order,] one hundred dollars, for value received.

Albany, May 1, 1859. A. B.

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* They are extracted from the "New Clerks' Assistant," published by C. M. Saxton, 25 Park Row, New York, which we commend to our readers, as one of the most valuable business guides which we have ever seen, containing full and reliable legal instruction and practical business forms relating to all ordinary transactions.

† Where a note is to be on interest, the words, "with interest," may be added to this and the following forms. The rule of law in regard to interest, where none is mentioned, is, that notes on time draw interest after due, and notes on demand, after the demand be made.

The Same, Joint and several.

$200. Ninety days from date, for value received, we, or either of us, promise to pay C. D., or bearer, [*or*, order,] two hundred dollars.
Albany, May 1, 1859. A. B.
E. F.

Note, not Negotiable.

$50. Three months after date, I promise to pay C. D. fifty dollars, for value received. A. B.
Albany, May 1, 1859.

Note, Payable on Demand.

$50. On demand, I promise to pay C. D., or bearer, [*or*, order,] fifty dollars, for value received. A. B.
Albany, May 1, 1859.

Note, Payable at Bank.

$500. Sixty days after date, for value received, I promise to pay C. D., or order, five hundred dollars, at the Mechanics' and Farmers' Bank.
Albany, May 1, 1859. A. B.

Note, Payable by Installments.

$500. For value received, I promise to pay C. D., or bearer, [*or*, order,] five hundred dollars, in the following manner: one hundred dollars in three months, one hundred dollars in six months, one hundred dollars in one year, and two hundred dollars in two years from date, with interest on the several sums, as they become due, [*or*, with annual interest.] A. B.
Albany, May 1, 1859.

Note, Payable in Specific Articles.

$50. One year after date, for value received, I promise to pay C. D., or bearer, [*or*, order,] fifty dollars, in second quality pine lumber, at the current price. A. B.
Albany, May 1, 1859.

Memorandum Note for Money Lent.

$100. Borrowed of C. D., one hundred dollars, payable on demand.
Albany, May 1, 1859. A. B.

Note, with Surety.

$100. One year from date, I promise to pay E. F., or bearer, [*or*, order,] one hundred dollars, for value received. A. B.
Albany, May 1, 1859. C. D., Surety.

RECEIPTS.

A receipt in full, though strong evidence, is not conclusive; and the party signing such receipt will be permitted to show a mistake or error therein, if any exist.

Receipts for the payment of money, are open to examination, and may be varied, explained, or contradicted, by parol testimony.

Where a receipt is given for money paid on a bond or contract, and an endorsement also made, the latter should mention the fact that a receipt was given for the same sum.

A release must be by an instrument sealed. The most beneficial release is one of all demands. The word "demand" is more comprehensive than any other, except "claim," and when it is used, all classes of actions and rights of action are extinguished.

Forms of Receipts.

General Form of Receipt on Account.

$50. Albany, May 1, 1859.

Received of C. D. fifty dollars to apply on account. A. B.

Receipt in Full.

$110.10. Albany, May 1, 1859.

Received of C. D. one hundred ten dollars and ten cents, in full of all demands against him. A. B.

Receipt for Money Paid by a Third Person.

$100. Auburn, March 1, 1859.

Received of C. D., by the hand of E. F., one hundred dollars, to apply on account of said C. D. A. B.

Receipt for Money on a Bond.

$200. Auburn, April 1, 1859.

Received of C. D. two hundred dollars to apply on his bond to me, dated the day of 18 , being the same sum this day endorsed on said bond. A. B.

Receipt for Interest Money

$140. Albany, May 1, 1859.

Received of C. D. one hundred and forty dollars, being the annual interest due on his bond, dated the day of , 18 , given to me, [*or*, to E. F.,] and conditioned for the payment of the sum of two thousand dollars, in three years from date, with annual interest.

A. B.

Receipt to be Endorsed on a Bond or Contract.

$140. Albany, May 1, 1859.

Received of C. D. one hundred and forty dollars, being the annual interest due on the within bond, and the same sum this day receipted by me to the said C. D. A. B.

CHATTEL MORTGAGE.

Every mortgage or conveyance intended to operate as a mortgage of goods and chattels, which shall not be accompanied by an immediate delivery and continued change of possession of the things mortgaged, is absolutely void as against the creditors of the mortgagor, and as against subsequent purchasers and mortgagees in good faith, unless the mortgage, or a true copy thereof, be filed in the town or city where the mortgagor therein, if a resident of this State, resides at the time of the execution thereof; and if not a resident, then in the city or town where the property so mortgaged may be, at the time of such execution. In the city of New York such instruments are to be filed in the office of the Register; in the other cities and county towns of this State, in the office of the County Clerk; and in all other towns in the office of the Town Clerk thereof. The actual and continued change of possession above mentioned, must be literal and not a mere legal, or fictitious change, in order to comply with the statute.

Every mortgage, filed according to the foregoing requisitions, ceases to be valid, as against the creditors of the person making the same, or subsequent purchasers or mortgagees in good faith, after the expiration of one year from the filing thereof; unless, within thirty days next preceding the expiration of the said term of one year, a true copy of such mortgage, together with a statement exhibiting the interest of the mortgagee in the property thereby claimed by him, by virtue thereof, be again filed in the office of the Clerk or Register aforesaid, of the town or city where the mortgagor then resides. A copy of such instrument, or any statement therein made, certified by the Clerk or Register, as aforesaid, is only evidence of the time of receiving and filing the same, as specified in the endorsement of such Clerk or Register.

Chattel Mortgage to Secure a Debt.

Whereas I, A. B., of the town of , in the county of , and State of , am justly indebted unto C. D., of, &c., in the sum of dollars, on account, to be paid on or before the day of next, with interest from this date: Now, therefore, in consideration of such indebtedness, and in order to secure the payment of the same, as aforesaid, I do hereby sell, assign, transfer, and set over, unto the said C. D., the property mentioned and described in the schedule hereinunder written; Provided, however, that if the said debt and interest be paid, as above specified, this sale and transfer shall be void; and this grant is also subject to the following conditions:

The property hereby sold and transferred is to remain in my possession until default be made in the payment of the debt and interest aforesaid, or some part thereof, unless I shall sell, or attempt to sell, assign, or dispose of, the said property, or any part thereof, or suffer the same unreasonably to depreciate in value; in which case the said C. D. may take the said property, or any part thereof, into his own possession.

Upon taking said property, or any part thereof, into his possession, either in case of default, or as above provided, the said C. D. shall sell the same at public or private sale; and after satisfying the aforesaid debt and the interest thereon, and all necessary and reasonable costs, charges, and expenses incurred by him, out of the proceeds of such sale, he shall return the surplus to me or my representatives.

Witness my hand and seal, this day of , 18 .

A. B. [L. S.]

SCHEDULE ABOVE REFERRED TO.

[*Insert the articles, and let the mortgagor sign his name at the foot of the list.*]

AGREEMENTS.

I. In the following cases, every agreement is void, unless such agreement, or some note or memorandum thereof, expressing the consideration, be in writing, and subscribed by the party to be charged therewith:

1. Every agreement that, by its terms, is not to be performed within one year from the making thereof;

2. Every special promise to answer for the debt, default, or miscarriage of another person;

3. Every agreement, promise, or undertaking, made upon consideration of marriage, except mutual promises to marry.

II. Every contract for the sale of any goods, chattels, or things, for the price of fifty dollars or more, is void, unless:

1. A note or memorandum of such contract be made in writing, and be subscribed by the parties to be charged thereby; or

2. Unless the buyer shall accept and receive part of such goods, or the evidences, or some of them, of such things in action; or

3. Unless the buyer shall, at the time, pay some part of the purchase money.

III. Every contract for the leasing for a longer period than one year or for the sale of, any lands, or any interest in lands, is void, unless the contract, or some note or memorandum thereof, expressing the consideration, be in writing, and be subscribed by the party by whom the lease or sale is to be made. An agreement to sell growing trees, with the right to enter and remove, is such an interest in lands as to require a contract in writing.

Forms of Agreements.

General Form of Agreement—Damages Fixed.

This agreement made the   day of   , one thousand eight hundred and   , by and between A. B., of the town of   , in the county of   , of the first part, and C. D., of   , of the second part, witnesseth: The said party of the second part covenants and agrees, to and with the party of the first part, to [*state the subject matter of the agreement.*] And the said party of the first part covenants and agrees to pay unto the said party of the second part, for the same, the sum of   dollars, lawful money of the United States, as follows: the sum of   dollars, on the   day of   , 18 , and the sum of   dollars on the   day of   , 18 , with the interest on the amount due, payable at the time of each payment.

And, for the true and faithful performance of all and every of the covenants and agreements above mentioned, the parties to these presents bind themselves, each unto the other, in the penal sum of   dollars, as fixed and settled damages, to be paid by the failing party.

In witness whereof, the parties to these presents have hereunto set their hands and seals, the day and year first above written.

Signed, sealed, and delivered in the presence of G. H.   A. B. [L. S.]
C. D. [L. S.]

Agreement on the Sale and Purchase of Personal Property.

This agreement, by and between A. B., of, &c., and C. D., of. &c., made the day of &c., witnesseth: That the said C. D., in consideration of the agreement hereinafter contained, to be performed by A. B., agrees to deliver to the said A. B., at his storehouse, in the village of , three hundred bushels of wheat, [*or*, two hundred barrels of pork, *as the case may be*,] of good merchantable quality, on or before the day of , 18 . And the said A. B., in consideration thereof, agrees to pay to the said C. D., the sum of one dollar for each and every bushel of the said wheat immediately upon the completion of the delivery thereof.

In witness, &c.

Agreement to Cultivate Land on Shares.

This agreement, made the day of, &c., between A. B., of, &c., and C. D., of, &c., witnesseth: That the said A. B. agrees that he will break up, properly fit, and sow with wheat, all that field belonging to the said C. D., lying immediately north of the dwelling-house and garden of the said C. D., in the town of aforesaid, and containing twenty acres or thereabouts, on or before the twenty-fifth day of September next; that when the said crop, to be sown as aforesaid, shall be in fit condition, he will cut, harvest, and safely house it in the barn or barns of the said C. D.; and that he will properly thresh and clean the same, and deliver one-half of the wheat, being the produce thereof, to the said C. D., at the granary near his dwelling-house, as aforesaid, on or before the day of , in the year 18 .

It is understood between the parties, that one-half of the seed-wheat is to be found by the said C. D.; that the said A. B. is to perform all the work and labor necessary in the premises, or cause it to be done; and that the straw is to be equally divided between the parties, within ten days after the crop of wheat shall have been threshed, as aforesaid.

In witness, &c.

Agreement for Building a House.

This agreement for building, made the day of , one thousand eight hundred and , by and between A. B., of, &c., of the first part, and C. D., of, &c., of the second part, witnesseth: That the said party of the second part, covenants and agrees to and with the said party of the first part, to make, erect, build and finish, in a good, substantial and workmanlike manner, on the vacant lot of the said party of the first part, situate on street, in the village of , a dwelling-house, agreeable to the draft, plan, and explanation, hereto annexed, of good, substantial materials, [*If the materials are to be furnished by the party of the first part, say:* of such materials as the said party of the first part shall find or provide for the same,] by the day of next.

And the said party of the first part covenants and agrees to pay unto the party of the second part, for the same, the sum of dollars, lawful money of the United States, as follows: the sum of dollars in thirty days from the date hereof, and the remaining sum of dollars, when the said dwelling-house shall be completely finished. [*If necessary, add:* And also that he will furnish and procure the necessary materials for the said work, in such reasonable quantities, and at such reasonable time or times, as the said party of the second part shall or may require.]

And for the true and faithful performance of all and every of the covenants and agreements above mentioned, the parties to these presents bind themselves, each unto the other, in the penal sum of dollars, as fixed and settled damages to be paid by the failing party.

In witness, &c.

Agreement to Sell Land.

This agreement, made and entered into the day of, &c., between A. B., of, &c., of the first part, and C. D., of, &c., of the second part, witnesseth: That the said party of the first part, in consideration of the covenants and agreements hereinafter contained, agrees to sell unto the said party of the second part, all that piece or parcel of land bounded and described, &c., [*insert description of premises,*] for the sum of dollars: And the said party of the second part, in consideration of the premises, agrees to pay to the said A. B. the sum of dollars in manner following, viz: dollars on the execution of these presents; dollars on the day of , next; and the remaining sum of dollars on the day of A. D. 18 , with the lawful interest from this date, on each payment, at the time of making the same.

And the said party of the first part also agrees, that on receiving the said sum of dollars, at the time and in the manner above mentioned, he will execute and deliver to the said party of the second part, at his own proper cost and expense, a good and sufficient deed for the conveying and assuring to him, the said party of the second part, the fee simple of the said premises, free from all incumbrance; which deed shall contain a general warranty and the usual full covenants. And it is understood that the stipulations aforesaid are to apply to, and to bind, the heirs, executors, administrators and assigns, of the respective parties; and that the party of the second part is to have immediate possession of the premises.

In witness, &c.

THE DOMESTIC ANIMALS.

INDEX TO THE DOMESTIC ANIMALS.

S.

T.

W.

Y.

PREFACE.

The immense advantages derived from the subjugation to our use of the Domestic Animals are perhaps not fully appreciated. Let any one carefully consider the valuable services rendered to civilized man by the horse, the ox, the cow, the sheep, the pig, the domestic fowl, and the honey bee. Let him take into view the labor they perform, the food and clothing, the comforts and conveniences which they supply, and he will at once see the importance of the *subjects* of this manual.

On each of these subjects carefully arranged treatises are given, showing the best breeds of the several animals, the true methods of breeding, feeding, breaking, working, fattening, etc., the various diseases to which they are subject, and their remedies and treatment. The matter is derived from varied and reliable sources, from the latest and best European and American writers, the object being to condense the most useful practical information within the shortest compass, and to so arrange it that any thing sought for could at once be found.

Every owner of a horse, a cow, or a pig, or the keeper of bees or of poultry, will find in this work hints and instruction of the most valuable kind, and which, if properly observed, will save to him in a single year many times the cost of this volume, in the economy of feeding, and in the increased value to him of the products of the animals kept.

It is intended to be a hand-book, in which can at any time be found the practical directions of men of the largest experience and of the closest observation in its several departments. Such a work it is believed cannot fail of being equally acceptable and useful to a large class of readers in every section of the country.

THE HORSE:

HOW TO BREED, BREAK, FEED, AND MANAGE,

AND HOW TO TREAT HIS DISEASES;

TOGETHER WITH

THE ART OF TAMING

AS PRACTICED BY

WILLIAM AND JOHN S. RAREY

DARLEY ARABIAN.

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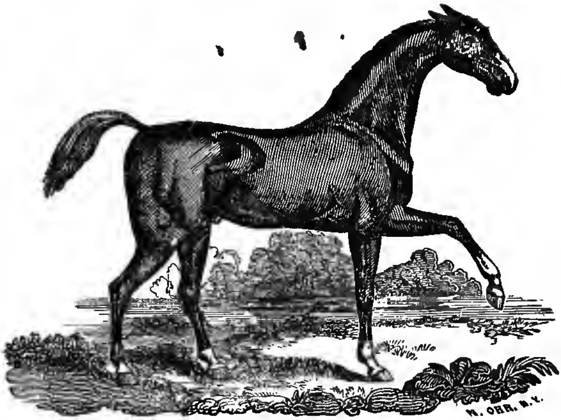
DOMESTIC ANIMALS.

THE HORSE.

THE CHARACTER OF THE HORSE.—The horse is now one of the most universally distributed animals, and everywhere he is recognized as the most useful amongst the quadruped servants of man, yielding in intelligence to the dog alone, and perhaps not to him; for in those countries, —some portions of Arabia for instance—in which he is admitted to the full and unrestricted companionship of man, sharing his food with the family of his master, and, like him, a dweller in the tent, his sagacity far surpasses that of our stable-reared horses, however affectionately they may be treated. In the early ages of the world the horse seems to have been devoted to the purposes of war or pleasure, whilst the ox was the agricultural drudge. But the beauty, strength, and tractability of the horse have now connected him, directly or indirectly, with almost all the purposes of life. If he differ in different countries in form and size, it is from the influence of climate, food, and cultivation; but otherwise, from the war-horse, as he is depicted in the sculptures of ancient temples, to the stately charger of Holstein and of Spain, or from the fleet and beautiful Arabian to the diminutive Shetlander, there is a similarity of form and character which clearly mark a common origin.

PRINCIPAL BREEDS IN THE UNITED STATES.—The principal breeds now common to this country are the *common horse*, descended from those brought in by the early colonists, and variously mixed with varieties subsequently introduced; the *thorough-bred*, or *race-horse;* the *Arabian*, the *Canadian*, the *Norman*, the *Cleveland bay*, the dray, and the *American trotting-horse.* Of the *common horse*, no specific description can be given, as he is a compound of many races variously and incongruously mixed.

The Race-Horse.—The English race-horse is undoubtedly the finest animal of his species in the world. In swiftness and energy he surpasses even his Arabian progenitor, though on the burning sands of the desert, to which not being acclimatized, he might not be equal in point of endurance. He is always distinguished by the beautiful head of the class from which his ancestors sprung; this being as finely set on a neck of faultless contour. His oblique shoulders give as good earnest of strength as do his well-formed hind-legs of speed. By the sculptor, perhaps, the legs from the knee downward might be pronounced unfit for the *beau ideal* of a perfect animal, yet this, though admitted by judges to be sometimes the case, is, after all, a matter of little consequence. Certain it is, that whenever the English race-horse has contended on fair ground



FLYING CHILDERS.

with the finest Arabian breeds, he has iuvariably come off conqueror, even though he may be by no means the finest specimen of his class.

The racer, however, with the most beautiful form, is occasionally a sorry animal. There is sometimes a want of energy in an apparently faultless shape for which there is no accounting; but there are two points among those just enumerated which will rarely or never deceive, a well-placed shoulder and a well-bent hinder leg.

The Darley Arabian was the parent of our best racing stock. He was purchased by Mr. Darley's brother at Aleppo, and was bred in the neighboring desert of Palmyra.

The immediate descendants of this invaluable horse were the Devonshire, or Flying Childers; the Bleeding, or Bartlett's Childers, who was never trained; Almanzor and others.

The two Childers were the means through which the blood and fame of their sire were widely circulated, and from them descended another Childers, Blaze, Snap, Sampson, Eclipse, and a host of excellent horses.

The Devonshire, or Flying Childers, so called from the name of his breeder, Mr. Childers, of Carr House, and the sale of him to the Duke of Devonshire, was the fleetest horse of his day. He was at first trained as a hunter, but the superior speed and courage which he discovered caused him to be soon transferred to the turf. Common report affirms that he could run a mile in a minute, but there is no authentic record of this. Childers ran over the round course at Newmarket (three miles six furlongs and ninety-three yards) in six minutes and forty seconds; and the Beacon course (four miles one furlong and one hundred and thirty-eight yards) in seven minutes and thirty seconds. In 1772 a mile was run by Firetail in one minute and four seconds.

More than twenty years after the Darley Arabian, and when the value of the Arabian blood was fully established, Lord Godolphin possessed a beautiful but singularly-shaped horse, which he called an Arabian, but which was really a Barb. His crest, lofty and arched almost to a fault, will distinguish him from every other horse.

He had a sinking behind his shoulders almost as peculiar, and a corresponding elevation of the spine toward the loins. His muzzle was uncommonly fine, his head beautifully set on, his shoulders capacious, and his quarters well spread out. He was picked up in France, where he was actually employed in drawing a cart; and when he was afterward presented to Lord Godolphin, he was in that nobleman's stud a considerable time before his value was discovered. It was not until the birth of Lath, one of the first horses of that period, that his excellence began to be appreciated. He was then styled an Arabian, and became, in even a greater degree than the Darley, the founder of the modern thorough-bred horses. He died in 1753, at the age of twenty-nine.

An intimate friendship subsisted between him and a cat, which either sat on his back when he was in the stable, or nestled as closely to him as she could. At his death the cat refused her food and pined away, and soon died. Mr. Holcroft gives a similar relation of the attachment between a race-horse and a cat, which the courser would take in his mouth and place in his manger and upon his back without hurting her. Chillaby, called from his great ferocity the mad Arabian, whom one only of the grooms dared to approach, and who savagely tore to pieces the image of a man that was purposely placed in his way, had his peculiar attachment to a lamb, who used to employ himself for many an hour in butting away the flies from him.

The Arabian Horse.—By far the most beautiful variety of the Arab horse is the Barb, as he is called from his having been brought to this country from Barbary, as vague a term as is Arabia, including the country between Tunis and Morocco. The Barb is, however, small, rarely exceeding fourteen hands, and is thus considerably less than the Bedouin horse of North and East Arabia. This breed of horses was introduced long ago into England; the celebrated Godolphin Arabian, so called, was supposed to be a Barb. It is to this breed that Spanish horses owe their fire and beauty, and most of the best English race-horses have the blood of the Barb in their veins. It is, however, remarkable that, considering the lavish expenditure on improving the breed of English horses, no attempts have been made to procure any of the mares of the highest Arabian stock. We appear to have placed the chief dependence on the Arab stallion, though it is well known to Oriental breeders that the mare is of by far the greater importance. Whoever attempts further tc infuse Arab blood into the English horse should go to Muscat or its vicinity for his stock; and not, as is frequently done, to Egypt or the Barbary coast, where the horses are, for the most part, small.

The Arabian horse would not be acknowledged by every judge to possess a perfect form; his head, however, is inimitable. The broadness and squareness of the forehead, the shortness and fineness of the muzzle, the prominence and brilliancy of the eye, the smallness of the ears, and the beautiful course of the veins, will always characterize the head of the Arabian horse.

His body may be considered as too light, and his chest as too narrow; but behind the arms the barrel generally swells out, and leaves sufficient room for the play of the lungs.

In the formation of the shoulder, next to that of the head, the Arab is superior to any other breed. The withers are high, and the shoulder-blade inclined backward, and so nicely adjusted that in descending a hill the point or edge of the ham never ruffles the skin. He may not be thought sufficiently high; he seldom stands more than fourteen hands two inches. The fineness of his legs, and the oblique position of his pasterns, may be supposed to lessen his strength; but the leg, although small, is flat and wiry; anatomists know that the bone has no common density, and the startling muscles of the fore-arm and the thigh indicate that he is fully capable of accomplishing many of the feats which are recorded of him. The Arab horse is as celebrated for his docility and good temper as for his speed and courage.

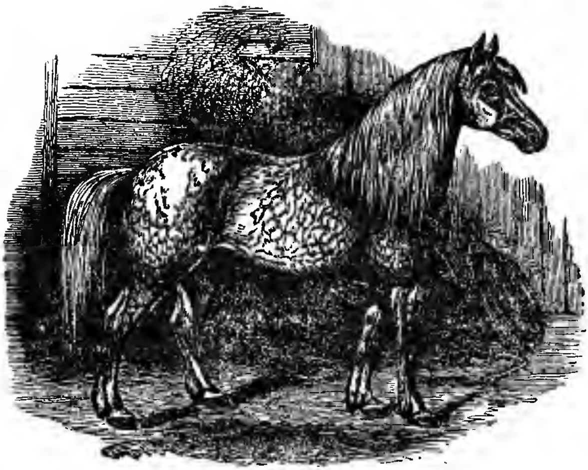
The kindness with which he is treated from a foal, gives him an affection for his master, a wish to please, a pride in exerting every energy in obedience to his commands, and, consequently, an apparent sagacity which is seldom seen in other breeds. The mare and her foal inhabit the same tent with the Bedouin and his children. The neck of the mare is often the pillow of the rider, and, more frequently, of the children, who are rolling about upon her and the foal; yet no accident ever occurs, and the animal acquires that friendship and love for man which occasional ill-treatment will not cause him for a moment to forget.

When the Arab falls from his mare, and is unable to rise, she will immediately stand still, and neigh until assistance arrives. If he lies down to sleep, as fatigue sometimes compels him, in the midst of the desert, she stands watchful over him, and neighs and rouses him if either man or beast approaches. An old Arab had a valuable mare that had carried him for fifteen years in many a hard-fought battle, and many a rapid weary march; at length, eighty years old, and unable longer to ride her, he gave her, and a cimeter that had been his father's, to his eldest son, and told him to appreciate their value, and never lie down to rest until he had rubbed them both as bright as a looking-glass. In the first skirmish in which the young man was engaged he was killed, and the mare fell into the hands of the enemy. When the news reached the old man, he exclaimed that "life was no longer worth preserving, for he had lost both his son and his mare, and he grieved for one as much as the other;" and he immediately sickened and died.

The Canadian Horse.—This variety of the horse is chiefly found in Canada, though they have been introduced, in considerable numbers, into the United States. They are chiefly of French descent, though many of the larger and more valuable of them are the produce of crosses with various English breeds. They are a very hardy race, easily kept, long-lived, and the larger varieties excellent farm and draught horses. Not as large as the Norman horse, they still exhibit many of his characteristics. Many stallions have been bronght into the states, and crossed with our common breeds. The result has tended to give vigor and compactness of form and constitution, and a continuance of the practice is suggested.

The Norman Horse.—This is a hardy and very valuable breed of French horses of recent introduction. Mr. Harris thus speaks of them:

"Those who are acquainted with the thorough-bred Canadian horse will see in him a perfect model, on a small scale, of the Percheron horse.

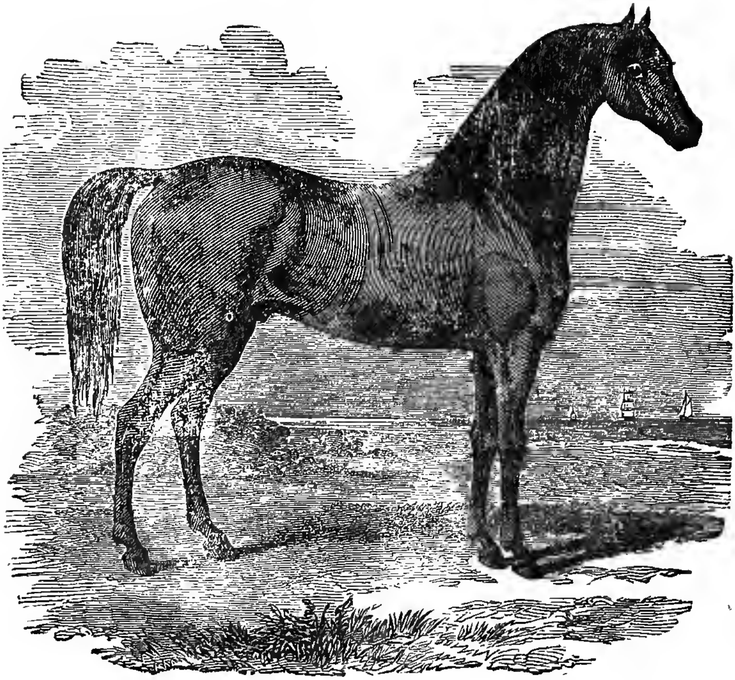


THE NORMAN HORSE.

This is the peculiar breed of Normandy, which is used so extensively throughout the northern half of France for diligence and post horses, and from the best French authorities I could command (I cannot now qnote the precise authorities), I learned that they were produced by the cross of the Andalusian horse upon the old heavy Norman horse, whose portrait may still be seen as a war-horse on the painted windows of the cathedral of Rouen, several centuries old. At the time of the occupation of the Netherlands by the Spaniards, the Andalusian was the favorite stallion of the north of Europe, and thus a stamp of the true Barb was implanted, which remains to the present day. If you will allow me to digress a moment, I will give you a short description of the old Norman draught-horse on which the cross was made. They average full sixteen hands in height, with head short, thick, wide, and hollow between the eyes; jaws heavy; ears short and pointed well forward; neck very short and thick; mane heavy; shoulder well inclined backward; back extremely short; rump steep; quarters very broad; chest deep and wide; tendons large; muscles excessively developed; legs very short, particularly from the knee and hock to the fetlock, and thence to the coronet, which is covered with long hair, hiding half the hoof; much hair on the legs."

Mr. Youatt, in speaking of the French horses, says: "The best French horses are bred in Limousin and Normandy. From the former district come excellent saddle-horses and hunters; and from the latter a stronger species, for the road, the cavalry or the carriage. The Norman horses are now much crossed by our hunters, and occasionally by the thorough-bred; and the English roadster and light draught horse has not suffered by a mixture with the Norman."

In his remarks on the coach-horse, Mr. Youatt says: "The Normandy carriers travel with a team of four horses, and from fourteen to twenty-two miles in a day, with a load of ninety hundred weight."



JUSTIN MORGAN.

The Committee of the N. Y. State Agricultural Society, "on stock owned out of the state," at the State Fair at Auburn, in 1846, thus spoke of the Morgans:

"Gifford Morgan, a dark chestnut stallion, fourteen hands and three inches high, aged twenty years, was exhibited by F. A. Weir, of Walpole, N. H. It is claimed on the part of his owner, that this horse possesses the celebrated 'Morgan' blood in greater purity than any other now living. 'General Gifford,' got by the above-named horse, was exhibited by Mr. C. Blodget, of Chelsea, Vt. In his size, figure, action, and color, he closely resembles his sire. Both are exceedingly compact horses, deep-chested and strong-backed, with fore-legs set wide apart, and carrying their heads (which are small, with fine, well-set eyes) high and gracefully, without a bearing-rein. Their action attracted the marked admiration of all. This breed are reputed to possess great bottom and hardiness, and every thing about the two presented, goes to prove that their reputation in this particular is well founded. For light carriage or buggy horses, it would be difficult to equal them, and if by crossing with prime large mares, of any breed, size could be obtained in the progeny, without losing the fire and action of the Morgan, the result of the cross would be a carriage of very superior quality. Your committee are not aware of the extent or result of such crosses, in the region where the Morgans originated. Unless experience has already demonstrated their inutility, we could recommend to our horse-breeders some well-considered experiments, limited at first, to test the feasibility of engrafting the Morgan characteristics on a larger horse."

The Cleveland Bay.—This horse is thus described by Mr. Youatt:

"The produce of Cleveland mares is a coach-horse of high repute, and likely to possess good action. His points are, substance well placed, deep and well-proportioned body, strong and clean bone under the knee, open, sound, and tough feet, with fine knee action, lifting his feet high. The full-sized coach-horse is in fact an overgrown hunter.

"The old Cleveland horse is almost extinct, and his place supplied in the manner just described. The Suffolk Punch, the product chiefly of Suffolk and some of the neighbouring districts, is regenerated, but is a different sort of animal to the breed of olden times. He usually varied from fifteen to sixteen hands in height, and was of a sorrel color. He was large-headed, low-shouldered, broad and low on the withers, deep, and yet round-chested; long in the back, large and strong in the quarters, round in the legs, and strong in the pasterns. He would throw his whole weight into the collar, and had sufficient hardihood and strength to stand a long day's work. The pure breed has, however, passed away, and is succeeded by a cross between the half or three-parts bred Yorkshire with the old Suffolk. He is taller than the former horse, somewhat higher and firmer about the shoulders, with sufficient quickness of action and honesty to exert himself to the utmost at a dead pull, whilst the proportion of the withers enables him to throw immense weight into the collar. The encouragement given by the Royal Agricultural Society of England for horses of this class has been the cause of considerable increase in their numbers."

Cleveland Bays have been introduced into this country, and have spread considerably. They are very large horses; and, for their size, are symmetrical in form, and fair in action. The cross with our common mares produces an excellent farm horse, though said to be of *sullen temper*.

The Dray-Horse.—Of the heavy black dray-horses, but few have been imported into this country, and they do not seem likely to become favorites here. Mr. Youatt says of them:

"The heavy black horse is the last variety it may be necessary to notice. It is bred chiefly in the midland counties, from Lincolnshire to Staffordshire. Many are bought up by the Surrey and Berkshire farmers at two years old,—and being worked moderately until they are four, earning their keep all the while, they are then sent to the London market, and sold at a profit of ten or twelve per cent.

It would not answer the *breeder's* purpose to keep them until they are fit for town work. He has plenty of fillies and mares on his farm for every purpose that he can require; he therefore sells them to a person nearer the metropolis, by whom they are gradually trained and prepared. The traveler has probably wondered to see four of these enormous animals in a line before a plow, on no very heavy soil, and where two lighter horses would have been quite sufficient. The farmer is training them for their future destiny; and he does right in not requiring the exertion of all their strength, for their bones are not yet perfectly formed, nor their joints knit; and were he to urge them too severely, he would probably injure and deform them. By the gentle and constant exercise of the plow, he is preparing them for that *continued and equable* pull at the collar, which is afterward so necessary. These horses are adapted more for parade and show, and to gratify the ambition which one brewer has to outvie his neighbor, than for any peculiar utility. They are certainly noble-looking animals, with their round, fat carcases, and their sleek coats, and the evident pride which they take in themselves; but they eat a great deal of hay and corn, and at hard and long-continued work they would be completely beaten by a team of active muscular horses an inch and a half lower.

The only plea which can be urged in their favor, beside their fine appearance, is, that as shaft-horses over the badly-paved streets of the metropolis, and with the immense loads they often have behind them, great bulk and weight are necessary to stand the unavoidable shaking and battering. Weight must be opposed to weight, or the horse would sometimes be quite thrown off his legs. A large heavy horse must be in the shafts, and then little ones before him would not look well.

The Trotting-Horse.—The relative merits of the English and American trotting-horse, have been the subjects of careful discussion by competent judges. The New York *Spirit of the Times*, one of the best authorities on this subject, thus canvasses the matter:

"Nimrod, in admitting the superiority of our trotting-horses to the 'English,' claims that the English approach *very near* to the Americans. Possibly the characteristic national vanity would not allow him to make a further concession. But there is no comparison whatever between the trotting horses of the two countries. Mr. Wheelan, who took *Rattler* to England, last season, and doubly distanced, with ease, every horse that started against him, as the *record shows*, informs us that there are twenty or more roadsters in common use in this city, that would compete successfully with the fastest trotters on the English turf. They neither understand the art of training, driving, nor riding them. For example: some few years since, *Alexander* was purchased by Messrs. C. and B. of this city, for a friend or acquaintance, in England. Alexander was a well known roadster here, and was purchased to order at a low rate. The horse was sent out and trials made of him; but so unsuccessful were they, that the English importers considered him an imposition. Thus the matter stood for a year or more When Wheelan arrived in England, he recognized the horse and learned the particulars of his purchase, and subsequent trials there. By his advice the horse was nominated in a stake, at Manchester we believe, with four or five of the best trotters in England, Wheelan agreeing to train and ride him. When the horses came upon the ground, the odds were four and five to one, against *Alexander*, who won by nearly a quarter of a mile. Wheelan says he took the track at the start, and widened the gap at his ease—that near the finish, being surprised that no horse was near him, as his own had not yet made a stroke, he got frightened, thinking some one might outbrush him,—that he put Alexander up to his work, and finally won by an immense way, no horse, literally, getting to the head of the quarter stretch, as he came out at the winning stand! The importers of Alexander, at any rate, were so delighted at his performance, that they presented Wheelan with a magnificent timing-watch, and other valuable presents, and sent Messrs. C. and B. a superb service of plate, which may, at any time, be seen at their establishment, in Maiden Lane."

This difference between English and American trotters is clearly attributable to superior training and jockeying. We have in this country hundreds of Rareys, who can teach not only the nobles of the realm but the common jockeys also, the mysterious arts of horse-training and managing, although they may not now be able to command for their services quite the compensation which that gentleman received.

BREEDING.—Breeders of all kinds of animals are unanimous in their opinions that it is necessary to have distinct varieties, usually distinguished as thorough-bred, for the propagation of the species, whether it be determined to carry on the unblemished pedigree, or to cross with other breeds. The high value set upon the short-horned cattle, is estimated principally by the purity of the blood; and the true Southdown or Leicester sheep by a similar criterion.

It is a general observation with those who have devoted attention to the subject, that horses and mares require much time after they have been trained, before they distinguish themselves as the progenitors of first-rate stock. This affords another argument in favor of early training. Both with mares and stallions their best foals have often not come forth till they were advanced in years. According to the presumed age of the Godolphin Arabian, he was thirteen years old when he became the sire of Regulus. Paynator and Whalebone were each of them twenty years old when their sons, Dr. Syntax and Sir Hercules, were foaled. Potoooooooo, Sultan, Langar, and Venison, were each of them sixteen years old when they became the sires respectively of Waxy, Bay Middleton, Epirus and Kingston. Melbourne was fifteen when he begot West Australian; Hap-hazard fourteen when he was the sire of Filho da Puta. Orville was the same age when he was the sire of Ebor, and twenty when he begot the still more celebrated Emilius; and an infinity of similar examples may be added. This property applies more generally to stallions than to mares: for it is sometimes apparent, that their first foals are vastly superior to their subsequent produce. This was the case in olden times with the dams of Mark Antony, Conductor, Pyrrhus, and Pantaloon; and more recently with Sultan, Touchstone, Sir Hercules, and Filho da Puta. Whether the subsequent change of partners has any prejudicial effect on the future progeny, is a subject worthy the most scrupulous attention of breeders. The case of Penelope is in favor of the assumption; for the superiority of her first seven foals by Waxy, over the others by different horses, is a fact which cannot be disputed. It is curious to remark, that when a thorough-bred mare has once had foals to common horses, no subsequent foals which she may have had by thorough-bred horses have ever evinced any pretensions to racing qualities. There may be an exception; but I believe I am correct in stating that there is not. It is laid down as a principle, "That when a pure animal, of any breed, has once been pregnant to one of a different breed, she is herself a cross ever after; the purity of her blood having been lost in consequence of this connection." This will no doubt be received by many persons as an abstruse hypothesis, but there are unequivocal incidents in favor of it; and that valuable monitor, past experience, must be received as a more convincing argument than the opinion of individuals, on subjects which are hidden from our understanding by the impenetrable veil which, on many occasions, enshrouds the secret mysteries of nature. There are events on record which prove this faculty, although they do not enlighten us as to the physical influences which control it. Sir Gore Ousely, when in India, purchased an Arabian mare, which during several seasons would not breed, and, in consequence, an intercourse with a zebra was resorted to; she produced an animal striped like its male parent. The first object being accomplished, that of causing her to breed, a thorough-bred horse was selected, but the produce was striped. The following year another horse was chosen, yet the stripes, although less distinct, appeared on the foal. Mr. Blaine relates that a chestnut mare also gave birth to a foal by a quagga, and that the mare was afterward bred from by an Arabian horse, but that the progeny exhibited a very striking resemblance to the quagga.

The progeny will, as a rule, inherit the general or mingled qualities of the parents. There is scarcely a disease by which either of them is affected, that the foal does not often inherit or show a predisposition to it. Even the consequences of ill-usage or hard work will descend to the progeny. There has been proof upon proof that blindness, roaring, thick wind, broken wind, spavins, curbs, ringbones, and founder, have been bequeathed to their offspring both by the sire and the dam.

Peculiarity of form and constitution will also be inherited. This is a most important but neglected consideration; for, however desirable or even perfect may have been the conformation of the sire, every good point may be neutralized or destroyed by the defective structure of the mare. The essential points should be good in both parents, or some minor defect in either be met, and got rid of by excellence in that particular point in the other. The unskillful or careless breeder, too often so badly pairs the animals that the good points of each are almost lost, the defects of both increased, and the produce is far inferior to both sire and dam.

The mare is sometimes put to the horse at too early an age; or, what is of more frequent occurrence, the mare is incapable from old age. The owner is unwilling to destroy her, and determines that she shall pay for her keeping by bearing him a foal. What is the consequence? The foal exhibits an unkindness of growth, a corresponding weakness, and there is scarcely an organ that possesses its natural and proper strength.

That the constitution and power of endurance of the horse are in a great measure inherited, no sporting man ever doubted. The qualities of the sire or the dam descend from generation to generation, and the excellences or defects of certain horses are often traced, and justly so, to some peculiarity in a far-distant ancestor.

It may, perhaps, be justly affirmed, that there is more difficulty in selecting a good mare to breed from than a good horse, because she should possess somewhat opposite qualities. Her carcass should be long, in order to give room for the growth of the fœtus; and yet with this there should be compactness of form and shortness of leg. What can they expect whose practice it is to purchase worn-out, spavined, foundered mares, about whom they fancy there have been some good points, and send them far into the country to breed from, and, with all their variety of shape, to be covered by the same horse? In a lottery like this there may be now and then a prize, but there must be many blanks.

As to the shape of the stallion, little, satisfactory, can be said. It must depend on that of the mare, and the kind of horse wished to be bred; but if there is one point absolutely essential, it is "compactness" —as much goodness and strength as possible condensed into a little space.

Next to compactness, the inclination of the shoulder will be regarded. A huge stallion, with upright shoulders, never got a capital hunter or hackney. From him the breeder can obtain nothing but a cart or dray horse, and that perhaps spoiled by the opposite form of the mare. On the other hand, an upright shoulder is desirable, if not absolutely necessary, when a mere slow draught-horse is required.

From the time of covering, to within a few days of the expected period of foaling, the cart-mare may be kept at moderate labor, not only without injury, but with decided advantage. It will then be prudent to release her from work, and keep her near home, and under the frequent inspection of some careful person.

When nearly half the time of pregnancy has elapsed, the mare should have a little better food. She should be allowed one or two feeds of grain in the day. This is about the period when they are accustomed to slink their foals, or when abortion occurs; the eye of the owner should, therefore, be frequently upon them. Good feeding and moderate exercise will be the best preventives of this mishap. The mare that has once aborted is liable to a repetition of the accident, and therefore should never be suffered to be with other mares between the fourth and fifth months; for such is the power of imagination or of sympathy in the mare, that if one suffers abortion, others in the same pasture will too often share the same fate. Farmers wash, and paint, and tar their stables, to prevent some supposed infection—the infection lies in the imagination.

The thorough-bred mare—the stock being intended for sporting purposes—should be kept quiet, and apart from other horses, after the first four or five months. When the period of parturition is drawing near, she should be watched and shut up during the night in a safe yard or loose box.

If the mare, whether of the pure or common breed, be thus taken care of, and be in good health while in foal, little danger will attend the act of parturition. If there is false presentation of the fœtus, or difficulty in producing it, it will be better to have recourse to a well-informed practitioner, than to injure the mother by the violent and injurious attempts that are often made to relieve her.

The parturition being over, the mare should be turned into some well-sheltered pasture, with a hovel or shed to run into when she pleases; and if she has foaled early, and grass is scanty, she should have a couple of feeds of grain daily. The breeder may depend upon it, that nothing is gained by starving the mother and stinting the foal at this time. It is the most important period of the life of the horse; and if, from false economy, his growth is arrested, his puny form and want of endurance will ever afterward testify the error that has been committed. The grain should be given in a trough on the ground, that the foal may partake of it with the mother. When the new grass is plentiful, the quantity of corn may gradually be diminished.

The mare will usually be found again at heat at or before the expiration of a month from the time of foaling, when, if she is principally kept for breeding purposes, she may be put again to the horse. At the same time, also, if she is used for agricultural purposes, she may go again to work. The foal is at first shut in the stable during the hours of work; but as soon as it acquires sufficient strength to toddle after the mare, and especially when she is at slow work, it will be better for the foal and the dam that they should be together. The work will contribute to the health of the mother; the foal will more frequently draw the milk, and thrive better, and will be hardy and tractable, and gradually familiarized with the objects among which it is afterward to live. While the mother, however, is thus worked, she and the foal should be well fed; and two feeds of corn, at least, should be added to the green food which they get when turned out after their work, and at night.

In five or six months, according to the growth of the foal, it may be weaned. It should then be housed for three weeks or a month, or turned into some distant rick-yard. There can be no better place for the foal than the latter, as affording, and that without trouble, both food and shelter. The mother should be put to harder work, and have drier food. One or two urine-balls, or a physic-ball, will be useful, if the milk should be troublesome or she should pine after her foal.

There is no principle of greater importance than the liberal feeding of the foal during the whole of his growth, and at this time in particular. Bruised oats and bran should form a considerable part of his daily provender. The farmer may be assured that the money is well laid out which is expended on the liberal nourishment of the growing colt; yet, while he is well fed, he should not be rendered delicate by excess of care.

A racing colt is often stabled; but one that is destined to be a hunter, a hackney, or an agricultural horse, should have a square rick, under the leeward side of which he may shelter himself; or a hovel, into which he may run at night, and out of the rain.

BREAKING.—The process of breaking-in should commence from the the very period of weaning. The foal should be daily handled, partially dressed, accustomed to the halter when led about, and even tied up. The tractability, and good temper, and value of the horse, depend a great deal more upon this than breeders are aware.

Every thing should be done, as much as possible, by the man who feeds the colt, and whose management of him should be always kind and gentle. There is no fault for which a breeder should so invariably discharge his servant as cruelty, or even harshness, toward the rising stock; for the principle on which their after usefulness is founded, is early attachment to, and confidence in man, and obedience, implicit obedience, resulting principally from this.

After the second winter the work of breaking-in may commence in good earnest. The colt may be bitted, and a bit selected that will not hurt his mouth, and much smaller than those in common use. With this he may be suffered to amuse himself, and to play, and to champ it for an hour, on a few successive days.

Breaking in Harness.—Having become a little tractable, portions of the harness may be put upon him, concluding with the blind winkers; and, a few days afterward, he may go into the team. It would be better if there could be one horse before and one behind him, besides the shaft horse. There should at first be the mere empty wagon. Nothing should be done to him, except that he should have an occasional pat or kind word. The other horses will keep him moving, and in his place; and no great time will pass, sometimes not even the first day, before he will begin to pull with the rest. The load may then be gradually increased.

Riding.—The agricultural horse is sometimes wanted to ride as well as to draw. Let his first lesson be given when he is in the team. Let his feeder, if possible, be first put upon him. He will be too much hampered by his harness, and by the other horses, to make much resistance; and, in the majority of cases, will quietly and at once submit. We need not to repeat, that no whip or spur should be used in giving the first lessons in riding.

Backing.—When he begins a little to understand his business, backing—the most difficult part of his work—may be taught him; first to back well without any thing behind him, and then with a light cart, and afterward with some serious load—always taking the greatest care not seriously to hurt his mouth. If the first lesson causes much soreness of the gums, the colt will not readily submit to a second. If he has been previously rendered tractable by kind usage, time and patience will do every thing that can be wished. Some carters are in the habit of blinding the colt when teaching him to back. This may be necessary with a restive and obstinate one, but should be used only as a last resort.

Obedience.—The colt having been thus partially broken-in, the necessity of implicit obedience must be taught him, and that not by severity, but by firmness and steadiness. The voice will go a great way, but the whip or the spur is sometimes indispensable—not so severely applied as to excite the animal to resistance, but to convince him that we have the power to enforce submission. Few, it may almost be said, no horses, are naturally vicious. It is cruel usage which has first provoked resistance. That resistance has been followed by greater severity, and the stubbornness of the animal has increased. Open warfare has ensued, in which the man has seldom gained advantage, and the horse has been frequently rendered unserviceable. Correction may, or must be used, to enforce implicit obedience after the education has proceeded to a certain extent, but the early lessons should be inculcated with kindness alone. Young colts are sometimes very perverse. Many days will occasionally pass before they will permit the bridle to be put on, or the saddle to be worn; and one act of harshness will double or treble this time; patience and kindness, however, will always prevail. On some morning, when he is in a better humor than usual, the bridle may be put on, or the saddle may be worn; and, this compliance being followed by kindness and soothing on the part of the breaker, and no inconvenience or pain being suffered by the animal, all resistance will be at an end.

The same principles will apply to the breaking-in of the horse for the road or the chase. The handling, and some portion of instruction, should commence from the time of weaning. The future tractability of the horse will much depend on this. At two years and a half, or three years, the regular process of breaking-in should commence. If it is delayed until the animal is four years old, his strength and obstinacy will be more difficult to overcome. The plan usually pursued by the breaker cannot perhaps be much improved, except that there should be much more kindness and patience, and far less harshness and cruelty, than these persons are accustomed to exhibit, and a great deal more attention to the form and natural action of the horse. A headstall is put on the colt, and a cavesson (or apparatus to confine and pinch the nose) affixed to it, with long reins. He is first accustomed to the rein, then led round a ring on soft ground, and at length mounted and taught his paces. Next to preserving the temper and docility of the horse, there is nothing of so much importance as to teach him every pace, and every part of his duty, distinctly and thoroughly. Each must constitute a separate and sometimes long-continued lesson, and that taught by a man who will never suffer his passion to get the better of his discretion.

After the cavesson has been attached to the headstall, and the long reins put on, the colt should be quietly led about by the breaker—a steady boy following behind, by occasional threatening with the whip, but never by an actual blow, to keep him moving. When the animal follows readily and quietly, he may be taken to the ring, and walked round, right and left, in a very small circle. Care should be taken to teach him this pace thoroughly, never suffering him to break into a trot. The boy with his whip may here again be necessary, but not a single blow should actually fall.

Becoming tolerably perfect in the walk, he should be quickened to a trot, and kept steadily at it; the whip of the boy, if needful, urging him on, and the cavesson restraining him. These lessons should be short. The pace should be kept perfect, and distinct in each; and docility and improvement rewarded with frequent caresses, and handfuls of corn. The length of the rein may now be gradually increased, and the pace quickened, and the time extended, until the animal becomes tractable in these his first lessons, toward the conclusion of which, crupper-straps, or something similar, may be attached to the clothing. These, playing about the sides and flanks, accustom him to the flapping of the coat of the rider. The annoyance which they occasion will pass over in a day or two; for when the animal finds that no harm comes to him, he will cease to regard them.

Bitting.—Next comes the bitting. The bits should be large and smooth, and the reins buckled to a ring on either side of the pad. There are many curious and expensive machines for this purpose, but the simple rein will be quite sufficient. It should at first be slack, and then very gradually tightened. This will prepare for the more perfect manner in which the head will be afterward got into its proper position, when the colt is accustomed to the saddle. Occasionally the breaker should stand in front of the colt, and take hold of each side rein near to the mouth, and press upon it, and thus begin to teach him to stop and to back on the pressure of the rein, rewarding every act of docility, and not being too eager to punish occasional carelessness or waywardness.

Shying.—The colt may now be taken into the road or street, to be gradually accustomed to the objects among which his services will be required. Here, from fear or playfulness, a considerable degree of starting and shying may be exhibited. As little notice as possible should be taken of it. The same or a similar object should be soon passed again, but at a greater distance. If the colt still shies, let the distance be still farther increased until he takes no notice of the object. Then he may be gradually brought nearer to it, and this will be usually effected without the slightest difficulty: whereas, had there been an attempt to force him close to it in the first instance, the remembrance of the contest would have been associated with every appearance of the object, and the habit of shying would have been established.

Use of the Whip.—Hitherto, with a cool and patient breaker, the whip may have been shown, but will scarcely have been used; the colt must now, however, be accustomed to this necessary instrument of authority. Let the breaker walk by the side of the animal, and throw his right arm over his back, holding the reins in his left, occasionally quickening his pace, and at the moment of doing this, tapping the horse with the whip in his right hand, and at first very gently. The tap of the whip and the quickening of the pace will soon become associated in the mind of the animal. If necessary, these reminders may gradually fall a little heavier, and the feeling of pain be the monitor of the necessity of increased exertion. The lessons of reining-in and stopping, and backing on the pressure of the bit, may continue to be practiced at the same time.

Use to the Saddle.—He may now be taught to bear the saddle. Some little caution will be necessary at the first putting of it on. The breaker should stand at the head of the colt, patting him and engaging his attention, while one assistant on the offside gently places the saddle on the back of the animal, and another on the near side slowly tightens the girths. If he submits quietly to this, as he generally will when the previous process of breaking-in has been properly conducted, the ceremony of mounting may be attempted on the following or on the third day. The breaker will need two assistants in order to accomplish this. He will remain at the head of the colt, patting and making much of him. The rider will put his foot into the stirrup and bear a little weight upon it, while the man on the off side presses equally on the other stirrup-leather; and according to the docility of the animal, he should gradually increase the weight until he balances himself on the stirrup. If the colt is uneasy or fearful, he should be spoken kindly to and patted, or a mouthful of grain be given to him; but if he offers serious resistance, the lessons must terminate for that day. He may probably be in better humor on the morrow.

When the rider has balanced himself for a minute or two, he may gently throw his leg over and quietly seat himself in the saddle. The breaker will then lead the animal round the ring, the rider sitting perfectly still. After a few minutes he will take the reins and handle them as gently as possible, and guide the horse by the pressure of them, patting him frequently, and especially when he thinks of dismounting; and, after having dismounted, offering him a little grain or green feed. The use of the rein in checking him, and of the pressure of the leg and the touch of the heel in quickening his pace, will soon be taught, and his education will be nearly completed.

Kindness united with Firmness.—The horse having thus far submitted himself to the breaker, these pattings and rewards must be gradually diminished, and implicit obedience mildly but firmly enforced. Severity will not often be necessary. In the great majority of cases it will be altogether uncalled for: but should the animal in a moment of waywardness dispute the command of the breaker, he must at once be taught that he is the slave of man, and that we have the power, by other means than those of kindness, to bend him to our will. The education of the horse should be that of the child. Pleasure is as much as possible associated with the early lessons, but firmness, or if need be, coercion, must establish the habit of obedience. Tyranny and cruelty will more speedily in the horse than even in the child, provoke the wish to disobey and, on every practicable occasion, the resistance to command. The restive and vicious horse is, in ninety-nine cases out of a hundred, made so by ill-usage and not by nature. None but those who will take the trouble to make the experiment are aware how absolute a command the due admixture of firmness and kindness will soon give us over any horse.

THE ART OF HORSE-TAMING, AS PRACTICED BY WILLIAM AND JOHN S. RAREY.

The great success which has attended the system of training horses, as practiced by the Rarey brothers, induces us to publish their system; and to illustrate it with appropriate engravings.* Their success is certainly wonderful. The system which they follow is, at once humane, rational and philosophical; and we earnestly commend its adoption to all who manage horses not only, but all the other domestic animals.

As evidence of Mr. Rarey's success in England, we copy the following instances from the *London Review.*

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* For the illustrations of the "Rarey system," we are under obligations to the *Rural New-Yorker*, and which it gives us pleasure to commend to the attention of our readers, as one of the most valuable family and agricultural journals published in this country. It has a wide circulation and well deserves it.

"Cruiser has been vicious from a foal, always troublesome to handle (we are using his owner's language), and showing temper on every opportunity. He would kneel in the street, and tear the ground with his teeth in his paroxysms of rage.—He would lean against the wall of his box, and kick and scream for ten minutes together; and he was returned from stables in which he had been placed, because his savage propensities rendered the care of him too dangerous an office for any man. For days, he would allow no one to enter his box; and on one occasion, tore an iron bar, one inch thick, in two with his teeth. Such an animal was not a very promising subject to operate upon; but Mr. Rarey undertook his cure. He first subjugated a two-year-old filley perfectly unbroken, in half an hour—riding her—opening an umbrella, beating a drum upon her, &c. He then took Cruiser in hand, and, says Lord Dorchester, 'in three hours, Mr. Rarey and myself mounted him.' He had not been ridden for nearly three years, and was so vicious that it was impossible even to dress him; and it was necessary to keep him muzzled constantly. The following morning Mr. Rarey led him behind an open carriage, on his way to London."

Twice the creature flew at the tamer with a fierce cry, but he kept out of his reach behind a half-door; at last he grew a little kinder, and Mr. Rarey succeeded in tying his head to the rack. This sense of restraint, which he had not known for three years, maddened the horse, the blood-vessels of the head dilated, and his frenzy for nearly twenty minutes was such, that Lord Dorchester begged Mr. Rarey not to peril his life, and to think no more of the £100 bond, which he had given, to return him cured in three months. However, America was not daunted; and when the horse was slightly exhausted, he made his first effort, and by the end of three hours the evil spirit seemed to have departed. On the Monday following, Mr. Rarey opened his school. The "incurably savage" horse was there, and was gentle as a dove, before an audience of full three hundred; all of whom had heard of his vicious propensities. You could have heard a pin drop, when the American horse-tamer asked his four-legged pupil to *shake hands* with him, at the termination of a lecture, listened to with intense interest, by an exalted and delighted assembly of the noblest and fairest in the land. The Wednesday after Mr. Rarey rode the horse about London.

PRINCIPLES OF THE RAREY SYSTEM.—"*First*—That the horse is so constituted by nature that he will not offer resistance to any demand made of him which he fully comprehends, if made in a way consistent with the laws of his nature. *Second*—That he has no consciousness of his strength beyond his experience, and can be handled according to our will without force. *Third*—That we can, in compliance with the laws of his nature, by which he examines all things new to him, take any object, however frightful, around, over, or on him, that does not inflict pain, without causing him to fear."

The affectionate enthusiasm with which the horse is spoken of by Mr. Rarey in the paragraph annexed, copied from his work, would also seem to indicate that any thing but harsh means are used in his subjection. Mr. Rarey says:

"The horse, according to the best accounts we can gather, has been

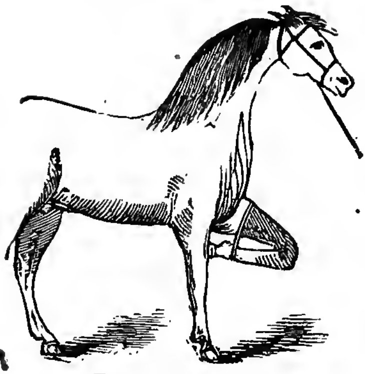

FIG. 1. FIRST POSITION.

the constant servant of man for nearly four thousand years, ever rewarding him with his labor, and adding to his comfort in proportion to his skill and manner of using him; but being to those who govern him by brute force, and know nothing of the beauty and delight to be gained from the cultivation of his finer nature, a fretful, vicious, and often dangerous servant; while to the Arab, whose horse is the pride of his life, and who governs him by the law of kindness, we find him to be quite a different animal. The manner in which he is treated from a foal gives him an affection and attachment for his master not known in any other country. The Arab and his children, the mare and her foal, inhabit the tent together; and, although the colt and the mare's neck are often pillows for the children to roll upon, no accident ever occurs, the mare being as careful of the children as of the colt. Such is the mutual attachment between the horse and his master, that he will leave his companions at his master's call, ever glad to obey his voice. And when the Arab falls from his horse, and is unable to rise again, he will stand by him and neigh for assistance; and if he lies down to sleep, as fatigue sometimes compels him to do in the midst of the desert, his faithful steed will watch over him, and neigh to arouse him if man or beast approaches. The Arabs frequently teach their horses secret signs or signals, which they make use of on urgent occasions to call forth their utmost exertions."

Mr. Rarey places much stress upon the kindly tones of the human voice, manner of speaking, the words used, and finishes his philosophizing upon the subject by detailing a short sketch of an "Arab and his steed," in which he endeavors to show the entire comprehension possessed by the horse of the language addressed to him. We quote it entire: "A Bedouin named Jabal possessed a mare of great celebrity. Hassan Pasha, then governor of Damascus, wished to buy the animal, and repeatedly made the owner the most liberal offers, which Jabal steadily refused. The Pasha then had recourse to threats, but with no better success. At length, one Gafar, a Bedouin of another tribe, presented himself to the Pasha, and asked him what he would give the man who should make him master of Jabal's mare. 'I will fill his horse's

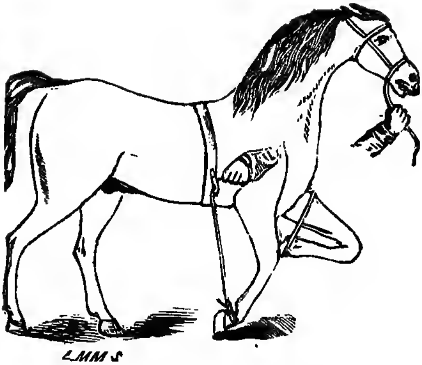

FIG. 2. TEACHING THE HORSE TO KNEEL.

nose-bag with gold,' replied Hassan. The result of this interview having gone abroad, Jabal became more watchful than ever, and always secured his mare at night with an iron chain, one end of which was fastened to his hind fetlock, whilst the other, after passing through the tent-cloth, was attached to a picket driven in the ground under the felt that served himself and his wife for a bed. But one midnight Gafar crept silently into the tent, and succeeded in loosening the chain. Just before starting off with his prize, he caught up Jabal's lance, and, poking him with the butt end, cried out, 'I am Gafar; I have stolen your noble mare, and will give you notice in time.' This warning was in accordance with the customs of the desert, for to rob a hostile tribe is considered an honorable exploit, and the man who accomplishes it is desirous of all the glory that may flow from the deed. Poor Jabal, when he heard the words, rushed out of the tent, and gave the alarm; then, mounting his brother's mare, accompanied by some of his tribe, he pursued the robber for four hours. The brother's mare was of the same stock as Jabal's, but was not equal to her; nevertheless, he outstripped those of all the other pursuers, and was even on the point of overtaking the robber, when Jabal shouted to him, 'Pinch her right ear, and give her a touch of the heel.' Gafar did so, and away went the mare like lightning, speedily rendering further pursuit hopeless.

"The pinch in the ear and the touch with the heel were the secret signs by which Jabal had been used to urge his mare to her utmost speed. Jabal's companions were amazed and indignant at his strange conduct. 'O, thou father of a jackass!' they cried, 'thou hast enabled the thief to rob thee of thy jewel.' But he silenced their upbraidings by saying, 'I would rather lose her than sully her reputation. Would you have me suffer it to be said among the tribe, that another mare had proved fleeter than mine? I have at least this comfort left me, that I can say she never met with her match.'"

When you enter the stable, in which is the horse to be experimented upon, stand still for a short time and let the horse observe you, and as soon as he stands quiet advance slowly, upon the left or near side, on a line with the shoulder, your right hand hanging by your side—

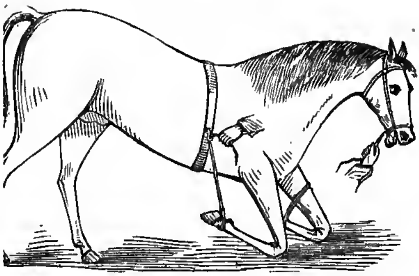

FIG. 3. THE HORSE IN A KNEELING POSTURE PREPARATORY TO LYING DOWN.

the left bent at the elbow, with the hand projecting. As you move forward go not too much toward his head or croup, so as not to make him move either forward or backward, thus keeping your horse stationary; if he does move a little either forward or backward, step a little to the right or left very cautiously; this will keep him in the right place. When almost in contact stand motionless for a second or two, giving the animal another opportunity to survey you, then, speaking in a soothing tone, place the hand lightly upon the shoulder, working up toward the neck, stroking in the direction in which the hair lies, down the side and front of the face to the nostrils. When the nose is reached suffer the hand to remain, that the horse may smell of it two or three times, and then as Mr. Rarey facetiously remarked, "you've got the animal." Now halter securely. Next in order, pass down the neck to the shoulder and onward to the fore-arm, when you must prevail upon the horse to lift the leg which is fastened in the manner described in our illustration, No. 1. A looped strap that can be slipped over the knee is the most expeditions. We will here remark that the floor should be liberally covered with straw (tan-bark or saw-dust is better), to prevent any injury resulting to the knees, and it would be well to apply knee-caps. While in this position, after letting him stand for a short period, buckle a strong surcingle around the horse, the surcingle having a loop upon it, (see fig. 2,) then fasten a strap around the fetlock of the off leg, passing the other extremity of the strap through the loop. When this portion of the business is completed you are ready for active operations.

The object now is, to back the horse about the stable until he is tired and evidently wishes to lie down, then compel him to move forward, and when the animal lifts the off foot for that purpose, draw upon the strap fastened around that leg, thus elevating it to a like position with its mate. The procedure is portrayed in our second engraving. Just as soon as this strap is drawn tightly, seize the halter close to the head and let the animal down easily upon his knees, as seen in fig. 3. This is a critical period, and the operator must possess coolness and energy to prevent disaster to himself or the animal. When the horse attempts to rise, pull his head around toward the shoulder and his demonstrations will prove futile. Bear your weight against his hips, and by voice and action endeavor to give him an idea of your wishes, continuing the movements as long as it is necessary, when he will

FIG. 4. LYING DOWN AND SUBDUED.

finally lie down. As soon as he is down (see fig. 4) and his struggling has ceased, caress his face and neck; handle every part of his body, making yourself familiar as possible. When in this position a short time, remove the straps, straighten out the limbs, fondle with him as much as you choose, and in fifteen or twenty minutes let him rise again to his feet. Repeat this operation, removing the straps as soon as he lies down, and in from two to five trials he is completely subdued—he will follow you like a dog, and you may take any liberties with him without a fear as to the result. If a thorough course of instruction is given—*and he must be educated; no boy's play about it*—he will seek the floor if you simply raise the fore-leg and give the command, "Lie down, sir."

We give the following rules for the guidance of any who may wish to practice, simply remarking that their *strict observance is imperative:*

First. The horse must not be forced down by violence, but must be tired out until he has a strong desire to lie down.

Second. He must be kept quiet on the ground until the expression of the eye shows that he is tranquilized, which invariably takes place by patiently waiting and gently patting the horse.

Third. Care must be taken not to throw the horse upon his neck when bent, as it may easily be broken.

Fourth. In backing him no violence must be used, or he may be forced on his haunches and his back broken.

Fifth. The halter and off rein are held in the left hand, so as to keep the head away from the latter; while, if the horse attempts to plunge, the halter is drawn tight, when, the off-leg being raised, the animal is brought on his knees, and rendered powerless for offensive purposes.

Catching the Colt.—If the colt is in the pasture, approach kindly and quietly, extending but one arm, and as you move toward him speak soothingly. If any difficulty is caused by his movements to avoid contact, keep the temper cool and persist in the effort to its completion, which cannot exceed a few minutes. If you rush after him with arms swinging, and hallooing, he fears bodily harm, and will exert his utmost strength to escape. This should not be—from first to last the presence of man should never be connected with the fear of injury.

Stabling the Colt.—Mr. Rarey calls stabling the most wary colt a ten minutes' job. Hitch a gentle horse by the stable door, and when all obstructions are removed, approach the colt on the opposite side quietly and slowly. To avoid you, he will move toward the horse and unsuspiciously enter the stable. The doorway is a novel thing to him—he possesses not the least idea of its purpose—he sees an opening and passes in to get away from those coming too near him, and the proximity of the trained horse insures his safety. Should he escape, patiently repeat the process. When secured, lead away the horse and give the colt a handful of grain.

General Rules.—As general rules for the various operations, Mr. Rarey recommends that the shed or stable used should be light, and high enough to admit of a man's riding around without danger to his head; that chickens, swine, and other animals be excluded, as serving to attract the attention of the horse; that on no account shall any person accompany the tamer, or be present at his operations, in order that the attention of the horse be not divided between two or more objects; that before entering the stable the tamer shall know accurately all the processes he intends to go through with the horse; and that sufficient time must be given the animal, at each stage of the proceedings, to fully comprehend what is being done, and what is wanted of him.

Putting on the Halter.—After your introduction to the colt, and by familiarity he has become at ease in your presence, you may proceed to halter him. A rope halter should never be used—one made of leather and properly fitted is the article needed. Approach him, and, after a few caresses, smoothing his head and neck without moving, fasten the end of the halter-strap about his neck. You stand at the left side of the colt. Laying your right arm across his neck, put, with your left hand, the long or buckle end of the upper part of your halter under his neck; hold it loosely with your right hand, and then loose your strap. Now you can lower the upper part; slip his nose into the appropriate place, and buckling the upper part, you have haltered your colt without in the least frightening him. Let him run around you, taking care never to check him roughly or draw him violently in any direction. Gradually approach him by shortening your hold upon the halter, until you can lay your hand upon his neck and again caress. When you have repeated this operation a few times, he will suffer you to reach his side without flying back or running away, and he is now ready for taking an advance step in his education.

Leading the Colt.—Up to this period the colt is ignorant of his strength, and it behooves the instructor to keep him so. If violence is resorted to—if the attempt to make him follow is instituted by pulling—he resists, and a battle commences. Stand a little on the near side, rub the nose and forehead, pull gently upon the strap, touching at the same time the hind-legs lightly with a whip, and he will start and advance a few steps. Repeat the operation several times, and he will soon learn to follow by gently pulling upon the halter.

Saddling and Bridling.—During the manipulations heretofore described, the mouth of the young colt should be frequently handled. Put a snaffle between his teeth, holding it with one hand while you caress him with the other. After a short time he will permit the bridle being placed upon him. The process of saddling is minutely described by Mr. Rarey, and we quote his remarks thereupon from the London papers. Mr. Rarey says:

"The first thing will be to tie each stirrup-strap into a loose knot, to make them short and prevent the stirrups from flying about and hitting him. Then double up the skirts and take the saddle under your right arm, so as not to frighten him with it as you approach. When you get to him, rub him gently a few times with your hand, and then raise the saddle very slowly, until he can see it, and smell and feel it with his nose. Then let the skirt loose, and rub it very gently against his neck the way the hair lies, letting him hear the rattle of the skirts as he feels them against him; each time getting a little further backward, and finally slipping it over his shoulders on his back. Shake it a little with your hand, and in less than five minutes you can rattle it about over his back as much as you please, and pull it off and throw it on again, without his paying much attention to it.

"As soon as you have accustomed him to the saddle, fasten the girth. Be careful how you do this. It often frightens the colt when he feels the girth binding him, and making the saddle fit tight on his back. You should bring up the girth very gently, and not draw it too tight at first, just enough to hold the saddle on. Move him a little, and then girth it as tight as you choose, and he will not mind it. You should see that the pad of your saddle is all right before you put it on, and that there is nothing to make it hurt him, or feel unpleasant to his back. It should not have any loose straps on the back part, to flap about and scare him.

"After you have saddled him in this way, take a switch in your right hand to tap him with, and walk about in the stable a few times with your right arm over your saddle, taking hold of the reins on each side of his neck with your right and left hands, thus marching him about in the stable until you teach him the use of the bridle, and can turn him in any direction, and stop him by a gentle pull of the rein. Always caress him, and loose the reins a little every time you stop him."

Mounting the Colt.—The weight of the arm in the saddle has accustomed him to a slight burden. Now get a block, or mounting-stool, about eighteen inches high, and place it at his side. Raise yourself very quietly upon the block, and when you have done so, loosen the stirrup-strap upon the rear side, place your foot in the stirrup, seize the off side of the saddle with the right hand, and cautiously bear your weight upon the stirrup and hand. After repeating this operation several times the colt learns there is nothing hurtful, and you must now lift yourself *very quietly* into the saddle. Once upon his back, speak gently to him, and if he does not move, pull the near rein a little and he will start. Repeat all the operations of getting on and off, and riding round, for a couple of hours.

The True Way to Bit a Colt.—The practice of placing a bitting harness upon a colt the first thing done with him, and buckling the bitting rein as tight as it can be drawn, as is frequently the case, meets the severe and just condemnation of Mr. Rarey. This is one of the most cruel punishments that can be inflicted upon a colt, and to one that is in the

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habit of carrying the head low, cannot fail of proving injurious. A horse should be well accustomed to the bit before you put on the bitting harness, and when you first bit him you should only rein his head up to that point where he naturally holds it, let that be high or low; he will soon learn that he cannot lower his head, and that raising it a little will loosen the bit in his mouth. This will give him the idea of raising his head to loosen the bit, and then you can draw the bitting a little tighter every time you put it on, and he will still raise his head to loosen it. By this means you will gradually get his head and neck in the position you wish him to carry it, and give him a graceful carriage without hurting him, making him angry, or causing his mouth to get sore.

Putting on the Harness.—The first requisite is a harness that will fit, and a little attention to this will facilitate matters very much. The collar needs special care, as hundreds of horses have been spoiled by those the chief features of which were defects. Take the harness into the stable, and go through the same process as with the saddle, letting the colt examine it as much as he desires; then put it on with care. When the operation is completed, put on the lines, using them gently, as the touch, if he is skittish, will startle him. Lead him back and forth until the fitting of the harness causes no disquietude, then take hold of the end of the traces, pulling slightly at first, and finally hitch him to whatever you wish him to pull.

To Hitch up the Colt.—As the colt has never paid any particular attention to a buggy or carriage, and does not know its uses, great caution must be observed on his introduction. Lead him gently to it; let him examine it in his own way—by sight, smell, and the exercise of the sense of feeling—and lead him all around it. Presently he will cease to notice it. Now draw the shafts to the left, and place him before the buggy. One man stands at his head. The other, at his right side, gently lifts the shafts, keeping one hand the while upon the colt's back, and drops the shafts on either side. They must not touch him as they are brought down. It is a nice job, and must be performed very deliberately. When you once have him between the shafts, shake them, so that he may not only hear but feel them against him. At first he is a little touchy. When he no longer minds them, you can fasten him up; and while the man at his head slowly leads him along, you work behind, get the lines over his back (which must be carefully done), and get in. Then you must not let him go faster than a walk. This Mr. Rarey insists upon, saying that the horse cannot at first comprehend the multifarious arrangements to which he is hitched, and if hurried is confused. If the horse is very wild, or attempts to kick, Mr. Rarey ties up one foot as seen in our illustration (fig. 1).

We have thus gone through the mode of training an unbroken colt to the saddle and harness, and to perfect docility, and shall now briefly treat of some other matters pertinent to the subject under consideration.

Blinkers on Horses.—Though not directly connected with the process of horse-taming, we cannot refrain from giving the opinions of Mr. Rarey upon the use of "blinkers." These we have long considered not only a useless appendage to the harness, but, in a greater or less degree, deleterious—affecting the sight—and have hailed, with gratified feelings, the slight movement that has been made in this country to dispose of them. Mr. Rarey says:

"I take great pleasure in stating that all my experience with and observation of horses proves clearly to me that blinkers should not be used, and that the sight of the horse, for many reasons, should not be interfered with in any way. Horses are only fearful of objects which they do not understand, or are not familiar with, and the eye is one of the principal mediums by which this understanding and this familiarity are brought about.

"The horse, on account of his very amiable nature, can be made, in the course of time, to bear almost any thing in any shape; but there is a quicker process of reaching his intelligence than that of wearing it into him through his skin and bones; and he, however wild or nervous, can be taught in a very short time to understand and not to fear any object, however frightful in appearance. Horses can be broken in less time and better without blinkers; but horses that have always worn them will notice the sudden change, and must be treated carefully the first drive. After that, they will drive better without the blinkers than with them.

"I have proved, by my own experiments, that a horse broken without blinkers can be driven past any omnibus, cab, or carriage, on a parallel line as close as it is possible for him to go, without ever wavering or showing any disposition to dodge. I have not in the last eight or ten years, constantly handling horses both wild and nervous, ever put blinkers on any of them, and in no case have I ever had one that was afraid of the carriage he drew behind him or of those he passed in the streets.

"The horse's eye is the life and beauty of the animal, as well as the index of all his emotions. It tells the driver, in the most impressive characters, what the horse's feelings are. By it he can tell the first approach of fear in time to meet any difficulty; he can tell if he is happy or sad, hungry or weary. The horse, too, when permitted to see, uses his eyes with great judgment. He sees better than we do. He can measure distances with his eyes better than we can, and, if allowed free use of them, would often save himself, by the quickness of his sight, from collisions, when the driver would fail to do so by a timely pull of the reins. It would also save many accidents to pedestrians in the streets, as no horse will run on to any person that he can see. * * * I have yet to find the man who, having once left them off, could ever be persuaded to put them on again. They are an unnecessary and injurious incumbrance to the horse, and I feel confident, if the cabmen of London will leave them off for one year, that blinkers on cab-horses will never be seen again in the streets, and will only be a thing to be read of as one of the follies happily reformed in the nineteenth century."

To Drive a Kicking Horse.—Bend up the near fore-foot (see fig. 1, first position), then draw a loop over the knee and up to the pastern joint, and secure it there. The horse cannot kick while standing on three legs, and there is this further advantage, handling in this plight conquers immediately. Sometimes he gets very angry, strikes the knee on the ground, and otherwise endeavors to get the knee loose. You can sit down and look at him at your ease till he gives up. When this takes place, let down the horse's foot, rub his leg, and caress him; let him rest a little, and then put the foot up again. Repeat this several times, till the horse has learned to walk on three legs. You then put the horse into a sulky. Having his foot hitched up, he cannot kick, howsoever much he may desire to; nor can he run away, if ever so much inclined. Mr. Rarey's theory is, that a horse kicks because he is afraid of something behind him, or of the man or other object approaching him. And he first incapacitates him from kicking, and then accustoms him to whatever he was before in fear of, be this a rattling vehicle, or a man's hand on his heels. A very few hours' time suffices to accomplish this taming of the most vicious brute.

About Balky Horses.—Mr. Rarey asserts that the horse knows nothing naturally about balking—and that the animal which practices any of the various freaks known under this name, does so either because bad management has led him into bad habits, or because, though willing to obey, he does not comprehend what his master desires of him. In all these cases, therefore, he maintains that the whip and the loud angry voice are entirely out of place, and only make bad worse. If the horse balks he is excited. The first thing, therefore, is to go to his head, speak to him kindly, pat and smooth him, and thus get him quieted down. The whip must not be shown at all. When he is calmed you can start your team. It is not a sudden jerk against the collar which moves the load, but a steady pressure. All kinds of violence, therefore, tend to the wrong course. The object is to start the horses even; and as the balky horse generally plunges first, you are to keep him back gently till they can both take the strain together. A quick way to accomplish this—but not the surest way, Mr. Rarey says—"is one I have myself seen practiced in Ohio. This is, to lift one fore-foot of the balky horse, and start the team. As he presses forward, you let him have his foot, when he will almost always take the strain with his mate." A better way, according to Mr. Rarey, is to let the lines hang quite slack, get the horses calmed down, and then stand in front of them, and turn them gently to the right without letting them bring a strain upon the traces. From this turn them as gently to the left. By this time they will be moving in unison, and, as you turn them again to the right, steady them in the collar, and they will go off together easily. If you are patient and careful, you can make any horse pull true by this management.

STABLE MANAGEMENT.—The first thing of importance in the treatment of a horse is the building which is provided for him, or his stable. Perhaps the best way of treating the subject is to show what his stable ought not to be, and that, unfortunately both for the animal and his owner, will be to show what it too generally is.

In the first place, it ought not to be dark; and in this respect there are but too many proprietors of horses who will, in their practice at any rate, be at issue with us, though the total or partial blindness of their horses should have taught them better; for from this cause in general springs the blindness of the animal, which, by nature, is no more predisposed to blindness than is his owner. And not only does a dark stable affect the sight of a horse, but his general health also, especially, as is often the case, if he be immured in his stable for days together. Light is just as essential to a healthy condition as food itself, and an animal can no more thrive without the one than the other. The man who invented dark stables was no doubt the progenitor of him who invented the barbarous practice of docking and nicking horses' tails.

The next thing to be considered is ventilation; and this—as stables are commonly ventilated, or rather not ventilated—is believed to be of no moment whatever. In many old country stables we find the door made of two portions, the upper one opening whilst the lower one is made fast. This is very well for farm stables; but this construction is not adapted for those where horses of the higher class are kept. With a door of this description, open at the top, and a lofty window at the other end, open at the top also, a draught takes place which is above the horse's back, and will ventilate the stable thoroughly, especially if the stable be lofty, as it always should be, though it is in general constructed so as to have a hay-loft over it—a great convenience, no doubt—but one which should not be permitted to reduce the height of the stable itself to some seven or eight feet; in which circumscribed space a team of horses are often confined for the night, under the necessity of breathing the same air as they have expired. To expect horses to be healthy or sound under such a condition is to expect an impossibility.

Ventilation.—A little consideration will show the importance of perfect ventilation. The air which the horse expires is as totally different a substance from that which he inhales as wood is from iron. He inhales atmospheric air, and the constituents of this pass through his lungs, and into his blood; he expires carbonic acid gas, one of the gases most inimical to animal life, as any man may convince himself who will go down into an old unused well. If this deadly gas be not carried off by proper ventilation, it becomes mixed with the atmospheric air of the stable, and is again inhaled, to the great injury of the animal's health. The greatest care is also requisite that it should be thoroughly carried off, and this can only be done as it comes out from the animal's body; when cold, it is heavier than atmospheric air, and sinks to the floor of the stable, in which case it is not so easily got rid of, but may lay the foundation of diseases innumerable, and will certainly shorten the usefulness, if not the life, of the animal. From this, as much as from any other cause, horses may truly be said not to live out half their days.

A thorough ventilation is as necessary in the winter as the summer, and there is infinitely less risk of injuring the horse by cold than by allowing him to breathe expired air over again. If accustomed to proper ventilation, he will never take cold from any judicious means adopted to promote his health and comfort. Pure air in winter is as necessary as in summer; whilst in the summer the more that can be admitted to cool the stable the better. The building should, then, be so constructed, as in summer to admit the greatest possible quantity of cool air, and in winter to admit sufficient for the preservation of the purity of the atmosphere, without running any risk from cold draughts. Care must also be taken not to admit draughts of air near the horse's heels, or diseased legs will be the result. Draughts cannot be too carefully guarded against, nor is it requisite that such should occur, if a little forethought only be exercised. Some writers on the subject advocate a chimney-shaft to be erected in the stable, by which the foul air can best escape, and also the admission of fresh air over the animal's head by means of perforated zinc.

Cleanliness.—The next consideration, and it is not less important than either of the preceding, is that of cleanliness. Too many persons believe, or they act as so believing, that the more a horse stands and sleeps among the filth of his own litter, the more he thrives. This is an error of ignorance or of idleness, perhaps both combined. The effect of it at any rate is to make the animal, in addition to breathing his own breath again, inhale the fetid ammoniacal steams which arise from his own ordure and urine. We have even heard farmers defend this mode, on the ground that the manure is better, as though the manure were worth any thing in comparison with the horse.

The Stable Floor.—A brick or stone stable floor is the best; if the latter, the stone should be roughened with small furrows, and in either case a deep drain sunk outside of the stable is necessary for keeping it perfectly dry, without which either brick or stone floors will be prejudicial from damp. This is of the utmost importance. Neither should such drains be used to carry off the urine. The floor should slope an inch to a yard, but only to the gutter which carries off the urine. Indeed, if this is carried off by an iron pipe with suitable openings, so much the better. A tub sunk outside the stable as a receptacle for the urine, will soon amply repay the farmer for his trouble; it is too valuable to be permitted to diffuse itself over the dung-heap in the yard, to be washed away by the first shower of rain.

Litter should always be allowed for a horse to stale upon, as it is easily removed, and a little gypsum thrown down occasionally will keep the stable free from smells. Nothing can be more offensive to either horse or man than the smell of putrid urine, whilst if this be permitted to run into a proper receptacle, and a little sulphuric acid added occasionally, nothing can exceed its value as a manure, which the farmer should be as careful to preserve as he is the corn which it fertilizes.

Within reason, the more room a horse has in his stall the less liable will he be to swollen legs. In no instance ought he to have less room than six feet, and if ten can be afforded him, so much the more will he thrive, the comfort being especially felt after a hard day's work. Loose boxes are indispensable to horses of value.

A perfect stable should never have a hay-loft over it. This of course will give a little more trouble to the stable-man, but where the comfort of a horse is concerned, that is of no consequence whatever. A deep manger with two or three iron bars across is far preferable to a rack or well for the reception of hay, and will more effectually prevent waste. An arrangement for water should also be provided. The front must of course be boarded up, with the exception of the part from which the horse eats. The advantage of this arrangement would be, that all the hay would be eaten, and not pulled down, as is generally the case, and trodden underfoot amongst the litter. Much hay will be saved by the use of a deep manger as a substitute for a rack; and an equal saving would take place in grain if the manger were made to slope slightly inward instead of outward, as is usually the ease. It would exceedingly puzzle a wasteful or mischievous horse to throw his corn out of such a manger if deep enough; but for this the manger as usually constructed affords him every facility.

Dung never ought to be allowed to be swept up in a corner, as is frequently the case, and all wet litter should be removed. In short, the more pains that are taken relative to a horse's comfort in a stable, the more will he repay those pains; and the farmer especially can have no better assurance that the more the horses thrive, the more will he himself thrive. The very fact of his attention to his horses independently of the more effective work arising therefrom, will beget a similar habit of attention to every thing else.

THE HORSE'S FOOD.—This should be oats and hay of the best quality; beans for hard-working horses occasionally varied with carrots or Swedes, bran mashes, and under some circumstances linseed gruel. Many persons are not aware that the price of musty grain and bad hay is vastly dearer than that of the same commodities of good quality, and that the worse the quality the higher the cost. It is so nevertheless, for whether the purchaser of inferior articles bargain for it or not, he always purchases with them indigestion, foulness of blood, looseness of the bowels, general debility, and glanders, all of these being too costly to be purchased into any stable. We once knew a farmer whose practice it was to sell all his best articles and keep the refuse of the farm for his own horses; the consequence was, that he never was without glanders or some other disease in his stable; and there was not a carter in the parish who did not give his team a wide berth wherever he met it with his own horses. It was the man's system, nevertheless, and he either could not see its banefulness or he would not alter it; so he died at last from it, having caught a glanderous infection from his own stable. Mr. Spooner, in speaking of this subject, thus testifies his own experience: "I have known a serious loss sustained by a proprietor of post and coach horses, from keeping a considerable stock of oats and neglecting to turn them; many horses became glandered and farcied, apparently in consequence of this circumstance."

Whole or Bruised Grain.—Much has been said of late respecting the advantage of bruising oats, and various machines are much in vogue for the purpose. Mr. Spooner says of them, "they are apt to produce diarrhœa, especially if the animal is worked hard." It is further alleged that many horses will not eat them with an appetite, and the opponents to the system go further, urging that unbruised oats excite a flow of saliva necessary to perfect digestion, which is not the case with those which are bruised. The explanation to the first of these questions supplies a very strong recommendation. The stomach having derived a sufficient quantity of nourishment from a moderate portion does not require more. With reference to the flow of the saliva, without entering upon the question how far it is necessary to assist digestion, no animal can swallow its food without a sufficiency of saliva to assist the act of deglutition; and it is not recommended to reduce the oats to flour, but merely to bruise them. Many persons fancy that by giving oats in small quantities and spreading them thinly over the manger the horses will be induced to masticate them. Those who have watched their operations will find that a greedy-feeding horse will drive his corn up into a heap, and collect with his lips as much as he thinks proper for a mouthful.

Little if any advantage arises from cutting hay into chaff, especially for the most valuable kind of horses. It is done in cart stables to prevent waste, which is often enormous in those departments where horses are permitted to pull the hay out of their racks and tread it underfoot.

The state of perfection to which the higher classes of the horse have been brought in this country, is attributable to the great attention devoted during a long period of time to the selection of the best descriptions for the purpose of perpetuating the species; the treatment they have received under the influence of a propitious climate, and the nature of the food with which they have been supplied; greater improvements are capable of being realized by judicious management.

Value of Different Kinds of Food.—Professor Playfair, who has made experiments on the quantity of nutritious matter contained in different kinds of food supplied to animals, found that in one hundred lbs. of oats, eleven lbs. represent the quantity of gluten wherewith flesh is formed, and that an equal weight of hay affords eight lbs. of similar substance. Both hay and oats contain about sixty-eight per cent. of unazotized matter identical with fat, of which it must be observed a vast portion passes off from the animal without being deposited. By this calculation, it appears that if a horse consumes daily four feeds of oats and ten lbs. of hay, the nutriment which he derives will be equivalent to about one lb. eleven oz. of muscle, and thirteen and a half lbs. of superfluous matter, which, exclusively of water, nearly approximates the exhaustion of the system by perspiration and the various evacuations.

Oats have been selected as that portion of the food which is to afford the principal nourishment. They contain seven hundred and forty-three parts out of a thousand of the nutritive matter. They should be about or somewhat less than a year old—heavy, dry and sweet. New oats will weigh ten or fifteen per cent. more than old ones, but the difference consists principally in watery matter, which is gradually evaporated. New oats are not so readily ground down by the teeth as old ones. They form a more glutinous mass, difficult to digest, and when eaten in considerable quantities are apt to occasion colic, or even staggers.

Barley is a common food of the horse on various parts of the Continent, and, until the introduction of the oat, seems to have constituted almost his only food. It is more nutritious than oats, containing nine hundred and twenty parts of nutritive matter in every thousand. There seems, however, to be something necessary besides a great proportion of nutritive matter, in order to render any substance strengthening, wholesome, or fattening; therefore it is that in many horses that are hardly worked, and indeed, in horses generally, barley does not agree with them so well as oats. They are occasionally subject to inflammatory complaints, and particularly to surfeit and mange.

When barley is given, the quantity should not exceed a peck daily. It should always be bruised, and the chaff should consist of equal quantities of hay and barley-straw, and not cut too short. If the farmer has a quantity of spotted or unsalable barley that he wishes thus to get rid of, he must very gradually accustom his horses to it, or he will probably produce serious illness among them. For horses that are recovering from illness, barley in the form of malt is often serviceable as tempting the appetite and recruiting the strength. It is best given in mashes—water considerably below the boiling heat being poured upon it, and the vessel or pail kept covered for half an hour.

The Swedish Turnip is an article of food the value of which has not been sufficiently appreciated, and particularly for agricultural horses. Although it is far from containing the quantity of nutritive matter which has been supposed, that which it has seems to be capable of easy and complete digestion. It should be sliced with chopped straw, and without hay. It quickly fattens the horse and produces a smooth glossy coat and a loose skin. It will be a good practice to give it once a day, and that at night when the work is done.

Carrots.—The virtues of this root are not sufficiently known, whether as contributing to the strength and endurance of the sound horse, or the rapid recovery of the sick one. To the healthy horse they should be given sliced in his chaff. Half a bushel will be a fair daily allowance. There is little provender of which the horse is fonder. The following account of the value of the carrot is not exaggerated: "This root is held in much esteem. There is none better, nor perhaps so good. When first given, it is slightly diuretic and laxative; but as the horse becomes accustomed to it, these effects cease to be produced. They also improve the state of the skin."

Potatoes have been given, and with advantage, in their raw state sliced with chaff; but where it has been convenient to boil or steam them, the benefit has been far more evident. Purging has then rarely ensued. Some have given boiled potatoes alone; and horses, instead of rejecting them, have soon preferred them even to the oat; but it is better to mix them with the usual manger feed, in the proportion of one pound of potatoes to two and a half pounds of the other ingredients. The use of the potato must depend on its cheapness and the facility for boiling it. Half a dozen horses would soon repay the expense of a steaming boiler in the saving of provender, without taking into the account their improved condition and capability for work.* A horse fed on potatoes should have his quantity of water materially curtailed.

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* Professor Low says that fifteen pounds of potatoes yield as much nourishment as four pounds and a half of oats. Von Thayer asserts that three bushels are equal to one hundred and twelve pounds of hay; and Curwen, who tried potatoes extensively in the feeding of horses, says that an acre goes as far as four acres of hay.

Effect on the Offspring.—It is now generally known that the embryo offspring partakes of the health or condition of the dam, therefore the food with which the mother is supplied must affect the foal. This is a subject too commonly disregarded by breeders, although it is constantly demonstrated after the foal comes into life. If a mare be supplied with food which produces relaxation, her foal will be in the same state; and constipation is recognized in a similar manner. The propriety of supplying a brood-mare with the best and most suitable kinds of food during pregnancy cannot be too strongly impressed. In the management of young stock every effort should be made, by giving them food which is adapted to the purpose, to bring them to maturity as early as possible; by these means the texture and development of the bones, the sinews, and the muscles is greatly accelerated. The constitution of each animal must be consulted, and it is highly important, if the acme of condition is to be attained by animals when they arrive at an age of maturity, that the growth and gradual development of their frames should be composed of those healthy and invigorating materials, upon which the structure of condition can be raised. To accomplish this, hay, oats, and occasionally beans, must form the principal items of food, and grass should be provided only in limited supplies during the summer months.

Grass, it may be observed, loses two-thirds of its weight, and a still greater proportion of bulk, when converted into hay; but that extraneous matter consists of moisture, possessing no portion of fibrine, consequently it contains none of those elements which increase muscular development. If a horse be supported upon grass alone, he must eat a vast quantity—equal to more than three times the proportion of hay—to derive an equivalent amount of nourishment; being very full of sap and moisture, it is quickly digested; consequently, the animal must be continually devouring it. This distends the stomach and bowels, and impairs the faculty of digestion; for the digestive powers require rest, as well as the other organs of the body, if they are to be preserved in a healthy state. The muscular system is debilitated, and fat accumulates; flatulent colic or gripes is produced, which not unfrequently becomes constitutional. Nothing can be more erroneous than the antiquated impression, that the purgative properties of young grass in the spring are conducive to the healthy state of the horse. When the *modus operandi* of that description of food is explained, the supposition of its being calculated to produce beneficial effects must vanish. The young green herbage is extensively overcharged with sap and moisture, of a crude, acrimonious nature, and it exists so abundantly, that a considerable portion of it cannot be taken up by the organs destined for the secretion of urine, or by the absorbent vessels of the body; a great quantity of this superfluous fluid, therefore, passes into the intestines, and is thus discharged in a watery state. But the mischief does not terminate immediately on the subsiding of the purgative action; the absorbent vessels, having been overloaded, become distended and relaxed, and some time intervenes before they resume their healthy tone, under the most judicious treatment. This is clearly exemplified by the habitual tendency which many horses exhibit of having swelled legs. When this evil exists, any persons who entertain a doubt as to the primary cause may readily convince themselves, by investigating the course of treatment to which the animal has been subjected. Horses which are reared on wet, marshy land are invariably afflicted with this relaxed condition of the absorbent vessels of the legs. Constant supplies of green succulent food render the defects constitutional, and the most scientific stable management is often frustrated when such animals are required to perform ordinary labor; their legs fail, not from anatomical defects, but from the cause explained, which operates injuriously upon a structure which is naturally perfect.

Superficial judges of horses do not mark the difference between the appearances of a fat and a muscular-formed animal. If the bones are covered, the points filled out, and the general contour looks pleasing to the eye, they conceive that every requisite is accomplished. A more fallacious impression cannot exist. A horse of very moderate pretensions, if in perfect condition, will prove himself infinitely superior in the quality of endurance or capability to perform work, than one of a higher character which is not in condition. If two horses are ridden side by side, at the moderate pace of seven or eight miles in the hour, on a warm day, in the summer, one of which has been taken out of a grass field, and the other fed on hay and grain, the difference will be very soon detected. The grass-fed horse will perspire profusely, yet the other will be cool and dry. This propensity to perspire likewise proves that the system of the former is replete with adipose deposit, and fluids destined to produce that substance; an unnecessary encumbrance, and in such quantities opposed to freedom of action.

Under an impression that an abundance of luxuriant grass will increase the flow of milk, it is frequently given to brood mares, but if it has the effect of producing relaxation, it is exceedingly prejudicial. A moderate portion of good milk is far preferable to that which is weak and poor. Thorough-bred mares are not unfrequently deficient in their lacteal secretions, more so than those of a common description. It is obviously necessary that either class should be supplied with good and nutritious food for the purpose of augmenting it when insufficient, but the nature of the food requires to be regulated by the constitution of the individual.

A mistaken notion of economy frequently induces persons to turn their horses into the grass fields during the summer months. A few words may serve to dispel that delusion. Twenty-two bushels of oats, allowing one bushel per week, which is sufficient for young stock or horses not in work, from the 15th of May to the 16th of October, may be estimated as the produce of a trifle more than half an acre of land. From ten to twelve hundred weight of hay may be estimated as the produce of another half-acre, although a ton and a half per acre, is not more than an average crop on land in good condition. It will require an acre of grass land, capable of producing a ton and a half of hay, to support a horse during the above-named period. When the relative value of a horse which has been kept on hay and grain, is compared with that of one which has been grazed, the verdict will be considerably against the latter.

A simple but invaluable appendage to the cart-stable is *the nose-bag.* In order that the lungs of the horse may have their full play, and especially that the speed of the horse may not be impeded, an exceedingly small stomach was given to him. It is, consequently, soon emptied of food, and hunger, and languor, and indisposition, and inability to work, speedily succeed. At length food is set before him; he falls ravenously upon it; he swallows it faster than his contracted stomach can digest it; the stomach becomes overloaded; he cannot, from the peculiar construction of that organ, get rid of the load by vomiting, and the stomach, or some of the vessels of the brain, becomes ruptured, and the animal dies. The farmer attributes this to an unknown or accidental cause, and dreams not that it is, in the great majority of cases, to be traced to voracious feeding after hard work and long fasting. The nose-bag is a simple but a kind contrivance, and an effectual preventive. No cart-horse on a journey of more than four or five hours, should be suffered to leave the farmer's yard without it.

A very slight inspection of the animal will always enable the owner to determine whether he is too well fed or not sufficiently fed. The size of the horse, and the nature of the work, and the season of the year, will make considerable difference in the quantity and the quality of the food. The following accounts will sufficiently elucidate the general custom:—"Mr. Harper, of Bank Hall, Lancashire, plows seven acres per week, the year through, on strong land, with a team of three horses, and allows to each weekly two bushels of oats, with hay, during the winter six months, and, during the remainder of the year, one bushel of oats per week. Mr. Ellman, of Glynde, in Sussex, allows two bushels of oats, with pease-haulm or straw, with but very little hay, during the winter months. He gives one bushel of oats with green food during the summer." There is very little difference in the management of these two gentlemen, and that probably arising from circumstances peculiar to their respective farms. The grand principles of feeding, with reference to agricultural horses, are, to keep the animal rather above his work, to give him good and wholesome food, and, by the use of the nose-bag or other means, never to let him work longer than the time already mentioned without being baited.

The horse of quick work should be allowed as much as he will eat, care being taken that no more is put into the manger than he will readily dispose of; and that the grain be consumed before the hay is given; if the former be not eaten up with an appetite, it must be removed before the stable is shut up. The quantity actually eaten will depend on the degree of work and the natural appetite of the horse; but it may be averaged at about sixty-six pounds of chaff, seventeen pounds and a half of beans, and seventy-seven pounds of oats per week.

The *watering* of the horse is a very important but disregarded portion of his general management. The kind of water has not been sufficiently considered. The difference between what is termed *hard* and *soft* water is a circumstance of general observation. The former contains certain saline principles which decompose some bodies, as appears in the curdling of soap, and prevent the decomposition of others, as in the making of tea, the boiling of vegetables, and the process of brewing. It is natural to suppose that these different kinds of water would produce somewhat different effects on the animal frame; and such is the fact. Hard water, freshly drawn from the well, will frequently roughen the coat of the horse unaccustomed to it, or cause griping pains, or materially lessen the animal's power of exertion. The racing and the hunting groom are perfectly aware of this; and so is the horse, for he will refuse the purest water from the well, if he can obtain access to the running stream, or even the turbid pool. Where there is the power of choice, the softer water should undoubtedly be preferred.

The temperature of the water is of far more consequence than its hardness. It will rarely harm, if taken from the pond or the running stream, but its coldness when recently drawn from the well has often been injurious; it has produced colic, spasm, and even death.

There is often considerable prejudice against the horse being fairly supplied with water. It is supposed to chill him, to injure his wind, or to incapacitate him for hard work. It certainly would do so if, immediately after drinking his fill, he were galloped hard, but not if he were suffered to quench his thirst more frequently when at rest in the stable. The horse that has free access to water will not drink so much in the course of a day as another, who, in order to cool his parched mouth, swallows as fast as he can, and knows not when to stop.

A horse may with perfect safety be far more liberally supplied with water than he generally is. An hour before his work commences, he should be permitted to drink a couple of quarts. A greater quantity might probably be objected to. He will perform his task far more pleasantly and effectively than with a parched mouth and tormenting thirst. The prejudice both of the hunting and the training groom on this point is cruel, as well as injurious. The task or the journey being accomplished, and the horse having had his head and neck dressed, his legs and feet washed, before his body is cleaned he should have his water. When dressed, his grain may be offered to him, which he will readily take; but water should never be given immediately before or after the grain.

GROOMING.—Of this little need be said to the agriculturist, since custom, and apparently without ill effect, has allotted so little of the comb and brush to the farmer's horse. The animal that is worked all day and turned out at night, requires little more to be done to him than to have the dirt brushed off his limbs. Regular grooming, by rendering his skin more sensible to the alteration of temperature, and the inclemency of the weather, would be prejudicial. The horse that is altogether turned out, needs no grooming. The dandriff, or scurf, which accumulates at the roots of the hair, is a provision of nature to defend him from the wind and the cold.

It is to the stabled horse, highly fed, and little or irregularly worked, that grooming is of so much consequence. Good rubbing with the brush, or the curry-comb, opens the pores of the skin, circulates the blood to the extremities of the body, produces free and healthy perspiration, and stands in the room of exercise. No horse will carry a fine coat without either unnatural heat or dressing. They both effect the same purpose; they both increase the insensible persiration; but the first does it at the expense of health and strength, while the second, at the same time that it produces a glow on the skin, and a determination of blood to it, rouses all the energies of the frame. It would be well for the proprietor of the horse if he were to insist—and to see that his orders are really obeyed—that the fine coat in which he and his groom so much delight, is produced by honest rubbing, and not by a heated stable and thick clothing, and most of all, not by stimulating or injurious spices. The horse should be regularly dressed every day, in addition to the grooming that is necessary after work.

When the weather will permit the horse to be taken out, he should never be groomed in the stable, unless he is an animal of peculiar value, or placed for a time under peculiar circumstances. Without dwelling on the want of cleanliness, when the scurf and dust that are brushed from the horse lodge in his manger, and mingle with his food, experience teaches, that if the cold is not too great, the animal is braced and invigorated to a degree that cannot be attained in the stable, from being dressed in the open air. There is no necessity, however, for half the punishment which many a groom inflicts upon the horse in the act of dressing; and particularly on one whose skin is thin and sensible. The curry-comb should at all times be lightly applied. With many horses, its use may be almost dispensed with; and even the brush needs not to be so hard, nor the points of the bristles so irregular, as they often are. A soft brush, with a little more weight of the hand, will be equally effectual, and a great deal more pleasant to the horse. A hair-cloth, while it will seldom irritate and tease, will be almost sufficient with horses that have a thin skin, and that have not been neglected. After all, it is no slight task to dress a horse as it ought to be done. It occupies no little time, and demands considerable patience, as well as dexterity.

Exercise.—Our observations on this important branch of stable management must have only a slight reference to the agricultural horse. His work is usually regular, and not exhausting. He is neither predisposed to disease by idleness nor worn out by excessive exertion. He, like his master, has enough to do to keep him in health, and not enough to distress or injure him; on the contrary, the regularity of his work prolongs life to an extent rarely witnessed in the stable of the gentleman. Our remarks on exercise, then, must have a general bearing, or have principal reference to those persons who are in the middle stations of life, and who contrive to keep a horse for business or pleasure, but cannot afford to maintain a servant for the express purpose of looking after it. The first rule we would lay down is, that every horse should have daily exercise. The animal that, with the usual stable feeding, stands idle for three or four days, as is the case in many establishments, must suffer. He is predisposed to fever, or to grease, or most of all, diseases of the foot; and if, after three or four days of inactivity, he is ridden far and fast, he is almost sure to have inflammation of the lungs or of the feet.

A gentleman's or a tradesman's horse suffers a great deal more from idleness than he does from work. A stable-fed horse should have two hours' exercise every day, if he is to be kept free from disease. Nothing of extraordinary, or even of ordinary labor, can be effected on the road or in the field without sufficient and regular exercise. It is this alone which can give energy to the system, or develop the powers of any animal.

The exercised horse will discharge his task, and sometimes a severe one, with ease and pleasure; while the idle and neglected one will be fatigued ere half his labor is accomplished; and, if he is pushed a little too far, dangerous inflammation will ensue. How often, nevertheless, does it happen, that the horse which has stood inactive in the stable three or four days, is ridden or driven thirty or forty miles in the course of a single day! This rest is often purposely given to prepare for extra exertion—to lay in a stock of strength for the performance of the task required of him; and then the owner is surprised and dissatisfied if the animal is fairly knocked up, or possibly becomes seriously ill. Nothing is so common and so preposterous as for a person to buy a horse from a dealer's stable, where he has been idly fattened for sale for many a day, and immediately to give him a long run after the hounds, and then to complain bitterly, and think that he has been imposed upon, if the animal is exhausted before the end of the chase, or is compelled to be led home suffering from violent inflammation. Regular and gradually-increasing exercise would have made the same horse appear a treasure to his owner.

Exercise should be somewhat proportioned to the age of the horse. A young horse requires more than an old one. Nature has given to young animals of every kind a disposition to activity; but the exercise must not be violent. A great deal depends upon the manner in which it is given. To preserve the temper, and to promote health, it should be moderate, at least at the beginning and the termination. The rapid trot, or even the gallop, may be resorted to in the middle of the exercise, but the horse should be brought in cool.

Management of the Feet.—This is the only division of stable management that remains to be considered, and one sadly neglected by the carter and groom. The feet should be carefully examined every morning, for the shoes may be loose, and the horse would have been stopped in the middle of his work; or the clenches may be raised, and endanger the wounding of his legs; or the shoe may begin to press upon the sole or the heel, and bruises of the sole or corn may be the result; and, the horse having stood so long in the stable, every little increase of heat in the foot, or lameness, will be more readily detected, and serious disease may often be prevented.

When the horse comes in at night, and after the harness has been taken off and stowed away, the heels should be well brushed out. Hand-rubbing will be preferable to washing, especially in the agricultural horse, whose heels, covered with long hair, can scarcely be dried again. If the dirt is suffered to accumulate in that long hair, the heels will become sore, and grease will follow; and if the heels are washed, and particularly during the winter, grease will result from the coldness occasioned by the slow evaporation of the moisture. The feet should be stopped—even the feet of the farmer's horse—if he remains in the stable. Very little clay should be used in the stopping, for it will get hard and press upon the sole. Cow-dung is the best stopping to preserve the feet cool and elastic; but before the stopping is applied, the picker should be run round the whole of the foot, between the shoe and the sole, in order to detect any stone that may have insinuated itself there, or a wound on any other part of the sole.

SHOEING, etc.—Far more than is generally imagined, do the comfort and health of the horse, and the safety of his rider, depend upon shoeing.

In taking off the old shoe, the clenches of the nails should always be carefully raised or filed off; and, where the foot is tender, or the horse is to be examined for lameness, each nail should be partly punched out.

The edges of the crust are then to be rasped to detect whether any stubs remain in the nail-holes, and to remove the crust, into which dust and gravel have insinuated themselves.

Next comes the important process of paring out, with regard to which it is almost impossible to lay down any specific rules. This, however, is undoubted, that far more injury has been done by the neglect of paring, than by carrying it to too great an extent. The act of paring is a work of much more labor than the proprietor of the horse often imagines. The smith, except he is overlooked, will frequently give himself as little trouble about it as he can; and that portion of horn which, in the unshod foot, would be worn away by contact with the ground, is suffered to accumulate month after month, until the elasticity of the sole is destroyed, and it can no longer descend, and its other functions are impeded, and foundation is laid for corn, and contraction, and navicular disease, and inflammation. That portion of horn should be left on the foot which will defend the internal parts from being bruised, and yet suffer the external sole to descend. How is this to be ascertained? The strong pressure of the thumb of the smith will be the best guide. The buttress, that most destructive of all instruments, being, except on very particular occasions, banished from every respectable forge, the smith sets to work with his drawing knife, and removes the growth of horn, until the sole will yield, although in the slightest possible degree, to the strong pressure of his thumb. The proper thickness of horn will then remain.

The quantity of horn to be removed, in order to leave the proper degree of thickness, will vary with different feet. From the strong foot a great deal must be taken. From the concave foot the horn may be removed until the sole will yield to a moderate pressure. From the flat foot little needs be pared; while the pumiced foot should be deprived of nothing but the ragged parts.

The crust should be reduced to a perfect level all round, but left a little higher than the sole, or the sole will be bruised by its pressure on the edge of the seating.

The heéls will require considerable attention. From the stress which is thrown on the inner heel, and from the weakness of the quarter there, the horn usually wears away considerably faster than it would on the outer one, and if an equal portion of horn were pared from it, it would be left lower than the outer heel. The smith should therefore accommodate his paring to the comparative wear of the heels, aud be exceedingly careful to leave them precisely level

The portion of the heels between the inflection of the bar and the frog should scarcely be touched—at least, the ragged and detached parts alone should be cut away. The foot may not look so fair and open, but it will last longer without contraction.

The bar, likewise, should be left fully prominent, not only at its first inflection, but as it runs down the side of the frog. The heel of the shoe is designed to rest partly on the heel of the foot and partly on the bar, for reasons that have been already stated. If the bar is weak, the growth of it should be encouraged; and it should be scarcely touched when the horse is shod, unless it has attained a level with the crust.

It will also be apparent, that the horn between the crust and the bar should be carefully pared out. Every horseman has observed the relief which is given to the animal lame with corns, when this angle is well thinned.

The degree of paring to which the frog must be subjected, will depend on its prominence, and on the shape of the foot. The principle has already been stated, that it must be left so far projecting and prominent, that it shall be just within and above the lower surface of the shoe; it will then descend with the sole sufficiently to discharge the functions that have been attributed to it. If it is lower, it will be bruised and injured; if it is higher, it cannot come in contact with the ground, and thus be enabled to do its duty. The ragged parts must be removed, and especially those occasioned by thrush, but the degree of paring must depend entirely on the principle just stated.

Putting on the Shoe.—The shoe should accurately fit the size of the foot; if too small, and the foot is rasped down to fit the shoe, the crust is thinned where it receives the nail, and the danger of puncture, and of pressure upon the sole, is increased; and a foot so artificially diminished in size, will soon grow over the shoe, to the hazard of considerable or permanent lameness.

The shoe should be properly beveled off, that the dirt, gravel, etc. which gets between it and the foot may be shaken out.

The web of the shoe is likewise of that thickness, that when the foot is properly pared, the prominent part of the frog shall lie just within and above its ground surface, so that in the descent of the sole, the frog shall come sufficiently on the ground to enable it to act as a wedge and to expand the quarters, while it is defended from the wear and injury it would receive, if it came on the ground with the first and full shock of the weight.

The nail-holes are, on the ground side, placed as near the onter edge of the shoe as they can safely be, and brought out near the inner edge of the seating. The nails thus take a direction inward, resembling that of the crust itself, and have firmer hold, and the weight of the horse being thrown on a flat surface, contraction is not so likely to be produced.

It is expedient not only that the foot and ground surface of the shoe should be most accurately level, but that the crust should be exactly smoothed and fitted to the shoe. Much skill and time are necessary to do this perfectly with the drawing-knife. The smith has adopted a method of more quickly and more accurately adapting the shoe to the foot. He pares the crust as level as he can, and then he brings the shoe to a heat somewhat below a red heat, and applies it to the foot, and detects any little elevations by the deeper color of the burned horn. This practice has been much inveighed against; but it is the abuse, and not the use of the thing which is to be condemned. If the shoe is not too hot, nor held too long on the foot, an accuracy of adjustment is thus obtained, which the knife would be long in producing, or would not produce at all. If, however, the shoe is made to burn its way to its seat, with little or no previous preparation of the foot, the heat must be injurious both to the sensible and insensible parts of the foot.

The heels of the shoe should be examined as to their proper width. Whatever is the custom of shoeing the horses of dealers, and the too prevalent practice in the metropolis of giving the foot an open appearance, although the posterior part of it is thereby exposed to injury, nothing is more certain than that, in the horse destined for road work, the heels, and particularly the seat of corn, can scarcely be too well covered. Part of the shoe projecting externally can be of no possible good, but will prove an occasional source of mischief, and especially in a heavy country. A shoe, the web of which projects inward as far as it can without touching the frog, affords protection to the angle between the bars and the crust.

Of the manner of attaching the shoe to the foot the owner can scarcely be a competent judge; he can only take care that the shoe itself shall not be heavier than the work requires—that, for work a little hard the shoe shall still be light, with a bit of steel welded into the toe—that the nails shall be as small, and as few, and as far from the heels as may be consistent with the security of the shoe; and that, for light work at least, the shoe shall not be driven on so closely and firmly as is often done, nor the points of the nails be brought out so high up as is generally practiced.

Calkins.*—There are few cases in which the use of calkins (a turning up or elevation of the heel) can be admissible in the fore-feet, except in frosty weather, when it may in some degree prevent unpleasant or dangerous slipping. If, however, calkins are used, they should be placed on both sides. If the outer heel only is raised with the calkin, as is too often the case, the weight cannot be thrown evenly on the foot, and undue straining and injury of some part of the foot or of the leg must be the necessary consequence.

Clips.—These are portions of the upper edge of the shoe, hammered out, and turned up so as to embrace the lower part of the crust and which is usually pared out a little, in order to receive the clip. They are very useful, as more securely attaching the shoe to the foot, and relieving the crust from that stress upon the nails which would otherwise be injurious. A clip at the toe is almost necessary in every draught-horse, and absolutely so in the horse of heavy draught, in order to prevent the shoe from being loosened or torn off by the pressure which is thrown upon the toe in the act of drawing. A clip on the outside of

* Vulgarly "corks."

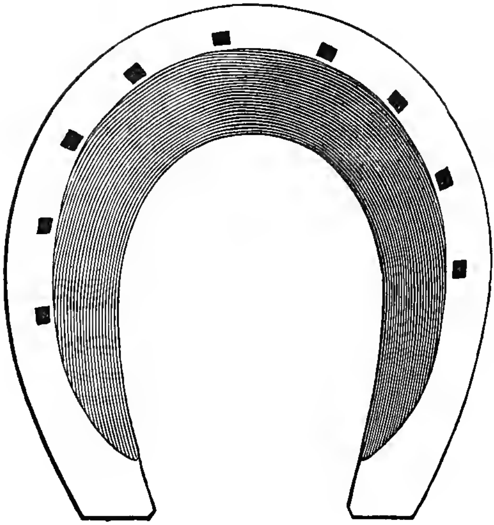
each shoe, at the beginning of the quarters, will give security to it. Clips are likewise necessary on the shoes of all heavy horses, and of all others who are disposed to stamp, or violently paw with their feet, and thus incur the danger of displacing the shoe; but they are evils, inasmuch as they press upon the crust as it grows down, and they should only be used when circumstances absolutely require them. In the hunter's shoe they are not required at the sides. One at the toe is sufficient.

The Hinder Shoe.—In forming the hinder shoes, it should be remembered that the hind limbs are the principal instruments in progression, and that in every act of progression, except the walk, the toe is the point on which the whole frame of the animal turns, and from which it is propelled. This part, then, should be strengthened as much as possible; and therefore the hinder shoes are made broader at the toe than the fore ones. Another good effect is produced by this—that, the hinder foot being shortened, there is less danger of overreaching, forging, or clinking, and especially if the shoe is wider on the foot surface than on the ground one. The shoe is thus made to slope inward, and is a little within the toe of the crust.

The shape of the hinder foot is somewhat different from that of the fore foot. It is straighter in the quarters, and the shoe must have the same form. For carriage and draught-horses generally, calkins may be put on the heels, because the animal will be thus enabled to dig his toe more firmly into the ground, and urge himself forward, and throw his weight into the collar with greater advantage; but the calkins must not be too high, and they must be of an equal height on each heel, otherwise, as has been stated with regard to the fore feet, the weight will not be fairly distributed over the foot, and some part of the foot or the leg will materially suffer. The nails in the hinder shoe may be placed nearer to the heel than in the fore shoe, because, from the comparatively little weight and concussion thrown on the hinder feet, there is not so much danger of contraction.

Different Kinds of Shoes.—The shoe must vary in substance and weight with the kind of foot, and the nature of the work. A weak foot should never wear a heavy shoe, nor any foot a shoe that will last longer than a month. Here, perhaps, we may be permitted to caution the horse-proprietor against having his cattle shod by contract, unless he binds his farrier or veterinary surgeon to remove the shoes once at least in every month; for, if the contractor, by a heavy shoe, and a little steel, can cause five or six weeks to intervene between the shoeings, he will do so, although the feet of the horse must necessarily suffer. The shoe should never be heavier than the work requires, for an ounce or two in the weight of the shoe will sadly tell at the end of a hard day's work. This is acknowledged in the hunting-shoe, which is narrower and lighter than that of the hackney, although the foot of the hackney is smaller than that of the hunter. It is more decidedly acknowledged in the racer, who wears a shoe only sufficiently thick to prevent it from bending when it is used.

The Concave-Seated Shoe.—An illustration is subjoined of a shoe which is useful and valuable for general purposes. It is employed in many of



THE CONCAVE-SEATED SHOE.

our best forges, and promises gradually to supersede the flat and the simple concave shoe, although it must, in many respects, yield to the unilateral shoe.

It presents a perfectly flat surface to the ground, in order to give as many points of bearing as possible, except that, on the outer edge, there is a groove or fuller, in which the nail-holes are punched, so that, sinking into the fuller, their heads project but a little way, and are soon worn down level with the shoe.

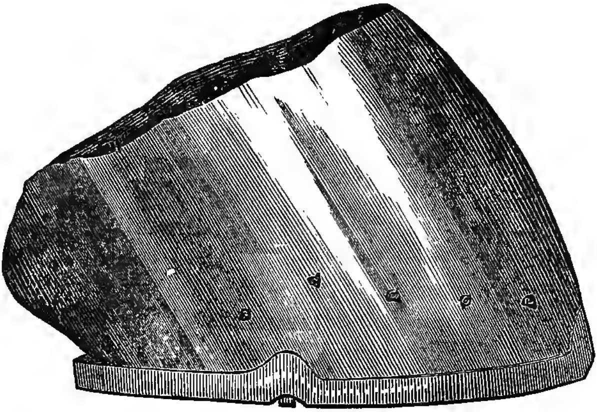
The web of this shoe is of the same thickness throughout, from the toe to the heel; and it is sufficiently wide to guard the sole from bruises, and, as much so as the frog will permit, to cover the seat of corn.

On the foot side it is seated. The outer part of it is accurately flat, and of the width of the crust, and designed to support the crust, for by it the whole weight of the horse is sustained.

Toward the heel this flattened part is wider, and occupies the whole breadth of the web, in order to support the heel of the crust and its reflected part, the bar; thus, while it defends the horn included within this angle from injury, it gives that equal pressure from the bar and the crust which is the best preventive against corns, and a powerful obstacle to contraction.

It is fastened to the foot by nine nails—five on the outside, and four on the inner side of the shoe; those on the outside extending a little farther down toward the heel, because the outside heel is thicker and stronger, and there is more nail-hold; the last nail on the inner quarter being farther from the heel, on account of the weakness of that quarter. For feet not too large, and where moderate work only is required from the horse, four nails on the outside and three on the inside will be sufficient; and the last nail, being far from the heels, will allow more expansion there.

The inside part of the web is beveled off, or rendered concave, that it may not press upon the sole. Notwithstanding the shoe, the sole does, although to a very inconsiderable extent, descend when the foot of the horse is put on the ground. It is unable to bear constant or even occasional pressure, and if it came in contact with the shoe, the sensible sole between it and the coffin-bone would be bruised, and lameness would ensue. Many of our horses, from too early and undue work, have the natural concave sole flattened, and the disposition to descend, and the degree of descent, are thereby increased. The concave shoe prevents, even in this case, the possibility of much injury, because the sole can never descend in the degree in which the shoe is or may be beveled. A shoe beveled still farther is necessary to protect the projecting or pumiced foot.



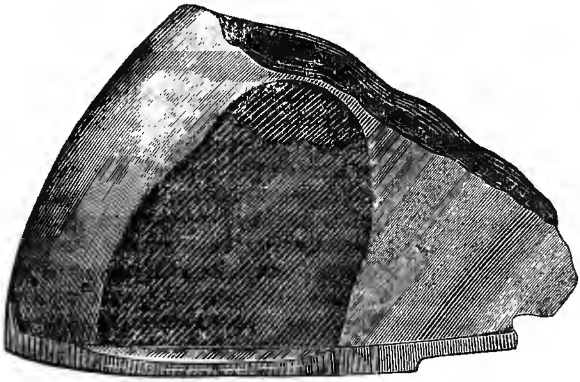
THE UNILATERAL SHOE.

The Unilateral or One-Side Nailed Shoe.—This is a material improvement in the art of shoeing, for which we are indebted to Mr. Turner.

What was the state of the foot of the horse a few years ago? An unyielding iron hoof was attached to it by four nails in each quarter, and the consequence was, that in nine cases out of ten the foot underwent a very considerable alteration in its form and in its usefulness. Before it had attained its full development—before the animal was five years old, there was, in a great many cases, an evident contraction of the hoof. There was an alteration in the manner of going. The step was shortened, the sole was hollowed, the frog was diseased, the general elasticity of the foot was destroyed—there was a disorganization of the whole horny cavity, and the value of the horse was materially diminished. What was the grand cause of this? It was the restraint of the shoe. The firm attachment of it to the foot by nails in each quarter, and the consequent strain to which the quarters and every part of the foot were exposed, produced a necessary tendency to contraction, from which sprang almost all the maladies to which the foot of the horse is subject.

The unilateral shoe has this great advantage: it is identified with the grand principle of the expansibility of the horse's foot, and of removing or preventing the worst ailments to which the foot of the horse is liable. It can be truly stated of this shoe, that while it affords to the whole organ an iron defense equal to the common shoe, it permits, what the common shoe never did or can do, the perfect liberty of the foot. We are enabled to present our readers with the last improvement of the unilateral shoe.

The preceding cut gives a view of the outer side of the off or right unilateral shoe. The respective situations of the five nails will be observed; the distance of the last from the heel, and the proper situations at which they emerge from the crust. The two clips will likewise be seen—one in the front of the foot, and the other on the side between the last and second nail.



INNER SIDE OF UNILATERAL SHOE.

This cut gives a view of the inner side of the unilateral shoe. The two nails near the toe are in the situation in which Mr. Turner directs that they should be placed, and behind them is no other attachment, between the shoe and the crust. The portion of the crust which is rasped off from the inner surface of the shoe, is now, we believe, not often removed from the side of the foot; it has an unpleasant appearance, and the rasping is somewhat unnecessary. The heel of this shoe exhibits the method which Mr. Turner has adopted, and with considerable success, for the cure of corns; he cuts away a portion of the ground surface at the heel, and injurious compression or concussion is rendered in a manner impossible.

There can be no doubt that this one-sided nailing has been exceedingly useful. It has, in many a case that threatened a serious termination, restored the elasticity of the foot, and enabled it to discharge its natural functions. It has also restored to the foot, even in bad cases, a great deal of its natural formation, and enabled the horse to discharge his duty with more ease and pleasure to himself, and greater security to his rider.

The Bar-Shoe.—A bar-shoe is often exceedingly useful. It is the continuation of the common shoe round the heels, and by means of it the pressure may be taken off from some tender part of the foot, and thrown on another which is better able to bear it, or more widely and equally diffused over the whole foot. It is principally resorted to in cases of corn, the seat of which it perfectly covers—in pumiced feet, the soles of which may be thus elevated above the ground and secured from pressure—in sand-crack, when the pressure may be removed from the fissure, and thrown on either side of it, and in thrushes, when the frog is tender, or is become cankered, and requires to be frequently dressed, and the dressing can by this means alone be retained. In these cases the bar-shoe is an excellent contrivance, if worn only for one or two shoeings, or as long as the disease requires it to be worn; but it must be left off as soon as it can be dispensed with. If it is used for the protection of a diseased foot, however it may be chambered and laid off the frog, it will soon become flattened upon it; or if the pressure of it is thrown on the frog in order to relieve the sand-crack or the corn, that frog must be very strong and healthy which can long bear the great and continued pressure. More mischief is often produced in the frog than previously existed in the part that was relieved. It will be plain that in the use of the bar-shoe for corn or sand-crack, the crust and the frog should be precisely on a level; the bar also should be the widest part of the shoe, in order to afford as extended bearing as possible on the frog, and therefore less likely to be injurious. Bar-shoes are evidently not safe in frosty weather. They are never safe when much speed is required from the horse, and they are apt to be wrenched off in a heavy, clayey country.

Tips.—Tips are short shoes reaching only half round the foot, and worn while the horse is at grass, in order to prevent the crust being torn by the occasional hardness of the ground or the pawing of the animal. The quarters at the same time being free, the foot disposed to contract has a chance of expanding and regaining its natural shape.

The Expanding Shoe.—Our subject would not be complete if we did not describe the supposed expanding shoe, although it is now almost entirely out of use. It is either seated or concave like the common shoe, with a joint at the toe, by which the natural expansion of the foot is said to be permitted, and the injurious consequences of shoeing prevented. There is, however, this radical defect in the jointed shoe, that the nails occupy the same situation as in the common shoe, and prevent as they do the gradual expansion of the sides and quarters, and allow only of the hinge-like motion at the toe. It is a most imperfect accommodation of the expansion of the foot to the action of its internal parts, and even this accommodation is afforded in the slightest possible degree, if it is afforded at all. Either the nails fix the sides and quarters as in the common shoe, and then the joint at the toe is useless; or if that joint merely opens like a hinge, the nail-holes near the toe can no longer correspond with those in the quarters, which are unequally expanding at every point. There will be more stress on the crust at these holes, which will not only enlarge them and destroy the fixed attachment of the shoe to the hoof, but often tear away portions of the crust. This shoe, in order to answer the intended purpose, should consist of many joints, running along the sides and quarters, which would make it too complicated and expensive and frail for general use.

While the shoe is to be attached to the foot by nails, we must be content with the concave-seated or unilateral one, taking care to place the nail-holes as far from the heels, and particularly from the inner heel, as the state of the foot and the nature of the work will admit; and where the country is not too heavy nor the work too severe, omitting all but two on the inner side of the foot.

Felt or Leather Soles.—When the foot is bruised or inflamed, the concussion or shock produced by the hard contact of the elastic iron with the ground gives the animal much pain, and aggravates the injury or disease. A strip of felt or leather is therefore sometimes placed between the seating of the shoe and the crust, which, from its want of elasticity, deadens or materially lessens the vibration or shock, and the horse treads more freely and is evidently relieved. This is a good contrivance while the inflammation or tenderness of the foot continues, but a very bad practice if constantly adopted. The nails cannot be driven so surely or securely when this substance is interposed between the shoe and the foot. The contraction and swelling of the felt or leather from the effect of moisture or dryness will soon render the attachment of the shoe less firm, there will be too much play upon the nails, the nail-holes will enlarge, and the crust will be broken away.

After wounds or extensive bruises of the sole, or where the sole is thin and flat and tender, it is sometimes covered with a piece of leather, fitted to the sole and nailed on with the shoe. This may be allowed as a temporary defense of the foot; but there is the same objection to its permanent use for the insecurity of fastening, and the strain on the crust and the frequent chipping of it. There are also these additional inconveniences, that if the hollow between the sole and the leather is filled with stopping and tow, it is exceedingly difficult to introduce them so evenly and accurately as not to produce partial or injurious pressure. A few days' work will almost invariably so derange the padding as to cause unequal pressure. The long contact of the sole with stopping of almost every kind, will produce not a healthy elastic horn, but that of a scaly, spongy nature, and if the hollow is not thus filled, gravel and dirt will insinuate themselves and eat into and injure the foot.

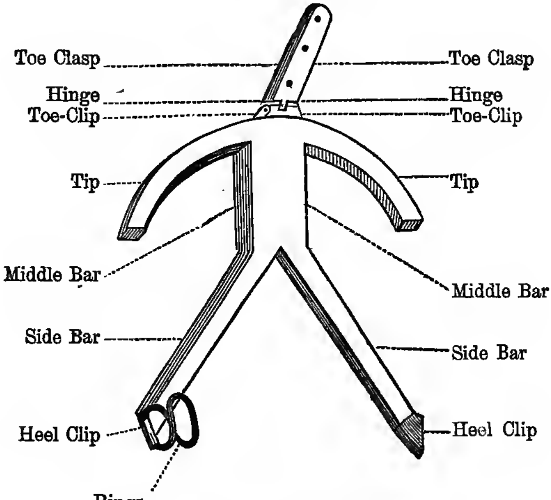
Stopping the Feet.—The general habit of stopping the feet requires some consideration. It is a very good or very bad practice, according to circumstances. When the sole is flat and thin it should be omitted, except on the evening before shoeing, and then the application of a little moisture may render the paring of the foot safer and more easy. If it were oftener used it would soften the foot, and not only increase the tendency to descent, but the occasional occurrence of lameness from pebbles or irregularities of the road.

Professor Stewart gives a valuable account of the proper application of stopping: "Farm horses seldom require any stopping. Their feet receive sufficient moisture in the fields, or if they do not get much they do not need much. Cart-horses used in the town should be stopped once a week or oftener during winter, and every second night in the hot weeks of summer. Groggy horses and all those with high heels, concave shoes, or hot and tender feet or an exuberance of horn, require stopping almost every night. When neglected, especially in dry weather, the sole becomes hard and rigid, and the horse goes lame or becomes lame if he were not so before."

One of two substances or a mixture of both is generally used for stopping the feet—clay and cow-dung. The clay used alone is too hard and dries too rapidly. Many horses have been lamed by it. If it is used in the stable, it should always be removed before the horse goes to work. It may perhaps be applied to the feet of heavy draught-horses, for it will work out before much mischief is done.

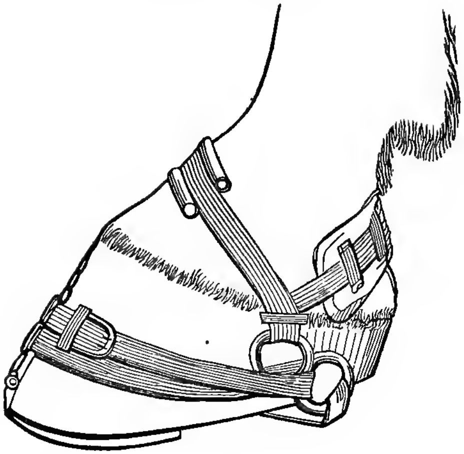
Cow dung is softer than the clay, and it has this good property, that it rarely or never becomes too hard or dry. For ordinary work, a mixture of equal parts of clay and cow-dung will be the best application; either of them, however, must be applied with a great deal of caution, where there is any disposition to thrush. Tow used alone or with a small quantity of tar will often be serviceable.

In the better kind of stables a felt pad is frequently used. It keeps the foot cool and moist, and is very useful when the sole has a tendency to become flat. For the concave sole tow would be preferable.



IRON OF THE HORSE-SANDAL

The Sandal.—The shoe is sometimes displaced when the horse is going at an ordinary pace, and more frequently during hunting; and no person who is a sportsman needs to be told in what a vexatious predicament every one feels himself who happens to loose a shoe in the middle of a chase.



THE SANDAL.

Mr. Percivall has invented a sandal which occupies a very small space in the pocket, can be buckled on the foot in less than two minutes, and will serve as a perfect substitute for the lost one on the road or in the field, or may be used by the race-horse when traveling from one course to another; or may be truly serviceable in cases of diseased feet, that may require at the same time exercise and daily dressing. The above is a sketch of the horse sandal.

From an inspection of the cut on the preceding page it will be seen that the iron of the sandal consists of three principal parts, to which the others are appendages—which are the tip, so called from its resemblance to the horse-shoe of that name; the middle bar, the broad part proceeding backward from the tip; and the side bars, or branches of the middle bar, extending to the heels of the hoof. The appendages are, the toe-clasp, the part projecting from the front of the tip, and which moves by a hinge upon the toe-clip, which toe-clasp is furnished with two iron loops. The heel-clips are two clips at the heels of the side bars which correspond to the toe-clip, the latter embracing the toe of the crust whilst the former embrace its heels. Through the heel-clips run the rings, which move and act like a hinge, and are double for the purpose of admitting both the straps. In the plate, the right ring only is represented; the left being omitted, the better to show the heel-clip. The straps, which are composed of web, consist of a hoof-strap and a heel and coronet-strap.

The hoof-strap is furnished with a buckle, whose office it is to bind the shoe to the hoof; for which purpose it is passed through the lower rings, and both loops of the shoe, and is made to encircle the hoof twice.

The heel and coronet-strap are furnished with two pads and two sliding loops; one, a movable pad, reposes on the heel, to defend that part from the pressure and friction of the strap; the other, a pad attached to the strap near the buckle affords a similar defense, to the coronet in front. The heel-strap runs through the upper rings, crosses the heel, and encircles the coronet; and its office is to keep the heels of the shoe closely applied to the hoof, and to prevent them from sliding forward.

In the application of the sandal, the foot is taken up with one hand, and the shoe slipped upon it with the other. With the same hand, the shoe is retained in its place, while the foot is gradually let down to rest on the ground. As soon as this is done, the straps are drawn as tight as possible, and buckled.

The preceding engraving represents an accurate delineation of the sandal, when properly fastened to the foot.

TO MANAGE A FALLEN HORSE.—Horses occasionally fall from bad riding, or bad shoeing, or overreaching, or an awkward way of setting on the saddle. The head, the neck, the knees, the back, or the legs will oftenest suffer. It is often difficult to get the animal on his legs again, especially if he is old and exhausted, or injured by the fall. The principal object is, to support the head, and to render it a fixed point from which the muscles may act in supporting the body.

If the horse is in harness, it is seldom that he can rise until he is freed from the shafts and traces. The first thing is to secure the head, and to keep it down, that he may not beat himself against the ground. Next, the parts of the harness connected with the carriage must be unbuckled—the carriage must then be backed a little way, so that he may have room to rise. If necessary, the traces must be taken off; and after the horse gets up, he must be steadied a little, until he collects himself.

THE VICES AND DISAGREEABLE OR DANGEROUS HABITS OF THE HORSE.—The horse has many excellent qualities, but he has likewise defects, and these occasionally amounting to vices. Some of them may be attributed to natural temper, for the human being scarcely discovers more peculiarities of habit and disposition than does the horse. The majority of them, however, as perhaps in the human being, are the consequences of a faulty education. Their early instructor has been ignorant and brutal, and they have become obstinate and vicious.

Restiveness.—At the head of all the vices of the horse is restiveness, the most annoying and the most dangerous of all. It is the produce of bad temper and worse education; and, like all other habits founded on nature and stamped by education, it is inveterate. Whether it appears in the form of kicking, or rearing, plunging, or bolting, or in any way that threatens danger to the rider or the horse, it rarely admits of cure.

A determined rider may to a certain extent subjugate the animal; or the horse may have his favorites, or form his attachments, and with some particular person he may be comparatively or perfectly manageable; but others cannot long depend upon him, and even his master is not always sure of him. It is a rule, that admits of very few exceptions, that he neither displays his wisdom nor consults his safety, who attempts to conquer a restive horse.

Balking.—Some horses have the habit of balking at first starting, but more from playfulness than desire of mischief. A moderate application of the whip will usually be effectual. Others, even after starting, exhibit considerable obstinacy and viciousness. This is frequently the effect of bad breaking. Either the shoulder of the horse had been wrung when he was first put to the collar, or he had been foolishly accustomed to be started in the break up-hill, and, therefore, all his work coming upon him at once, he gradually acquired this dangerous habit.

A hasty and passionate breaker will often make a really good-tempered young horse an inveterate balker. Every young horse is at first shy of the collar. If he is too quickly forced to throw his weight into it, he will possibly take a dislike to it, that will occasionally show itself in the form of balking as long as he lives. The judicious horse-breaker will resort to no severity, even if the colt should go out several times without even touching the collar. The example of his companion will ultimately induce him to take it voluntarily and effectually.

A large and heavy stone should be put behind the wheel before starting, when the horse, finding it more difficult to back than to go forward, will gradually forget this unpleasant trick. It will likewise be of advantage, as often as it can be managed, so to start that the horse will have to back up-hill. The difficulty of accomplishing this will soon make him readily go forward. A little coaxing, or leading, or moderate flagellation will assist in accomplishing the cure.

When, however, a horse, thinking he has had enough of work, or has been improperly checked or corrected, or beginning to feel the painful pressure of the collar, swerves, and balks, and backs, it is a more serious matter. Persuasion should first be tried; and, afterward, reasonable coercion, but no cruelty: for the brutality which is often exercised to compel a balking horse to throw himself habitually into the collar, never yet accomplished the purpose. The horse may, perhaps, be whipped into motion; but if he has once begun to balk, he will have recourse to it again whenever any circumstance displeases or annoys him, and the habit will be so rapidly and completely formed, that he will become insensible to all severity.

Sometimes a horse not often accustomed to balk betrays a reluctance to move, or a determination not to move. Before resorting to severity, the cause, if practicable, should be ascertained. The horse may be over-taxed, his withers may be wrung, or he may be insupportably galled or pained by the harness. These things should be examined into, and, if possible, rectified; for, under such circumstances, cruelty may produce obstinacy and vice, but not willing obedience.

They who are accustomed to horses know what seemingly trivial circumstances occasionally produce this vice. A horse whose shoulders are raw, or have frequently been so, will not start with a cold collar. When the collar has acquired the warmth of the parts on which it presses, the animal will go without reluctance. Some determined balkers have been reformed by constantly wearing a false collar, or strip of cloth round the shoulders, so that the coldness of the usual collar should never be felt; and others have been cured of the habit by keeping the collar on night and day, for the animal is not able to lie down completely at full length, which the tired horse is always glad to do. When a horse balks, not at starting, but while doing his work, it has sometimes been useful to line the collar with cloth instead of leather; the perspiration is readily absorbed, the substance which presses on the shoulder is softer, and it may be far more accurately eased off at a tender place.

Biting.—This is either the consequence of natural ferocity, or a habit acquired from the foolish and teasing play of grooms and stable-boys. When a horse is tickled and pinched by thoughtless and mischievous youths, he will first pretend to bite his tormentors; by degrees he will proceed farther, and actually bite them, and very soon after that, he will be the first to challenge to the combat, and without, provocation, seize some opportunity to gripe the incautious tormentor. At length, as the love of mischief is a propensity too easily acquired, this war, half playful and half in earnest, becomes habitual to him, and degenerates into absolute viciousness.

It is seldom that any thing can be done in the way of cure. Kindness will aggravate the evil, and no degree of severity will correct it. "I have seen," says Professor Stewart, "biters punished until they trembled in every joint, and were ready to drop, but have never in any case known them cured by this treatment, or by any other. The lash is forgotten in an hour, and the horse is as ready and determined to repeat the offense as before. He appears unable to resist the temptation, and in its worst form biting is a species of insanity."

Prevention, however is in the power of every proprietor of horses. While he insists on gentle and humane treatment of his cattle, he should systematically forbid this horse-play.

Getting the Cheek of the Bit into the Mouth.—Some horses that are disposed to be mischievous try to do this and are very expert at it. They soon find what advantage it gives them over their driver, who by this maneuver loses almost all command. Harsh treatment is here completely out of the question. All that can be done, is, by some mechanical contrivance to render the thing difficult or impossible, and this may be managed by fastening a round piece of leather on the inside of the cheek of the bit.

Kicking.—This, as a *vice*, is another consequence of the culpable habit of grooms and stable-boys of teasing the horse. That which is at first an indication of annoyance at the pinching and tickling of the groom, and without any design to injure, gradually becomes the expression of anger and the effort to do mischief. The horse, likewise, too soon recognizes the least appearance of timidity, and takes advantage of the discovery, and he cannot be justified who keeps a kicking horse in his stable.

Some horses acquire, from mere irritability and fidgetiness, a habit of kicking at the stall or the bail, and particularly at night. The neighboring horses are disturbed, and the kicker gets swelled hocks, or some more serious injury. This is also a habit very difficult to correct if suffered to become established. Mares are far more subject to it than horses.

Before the habit is inveterately established, a thorn bush or a piece of furze fastened against the partition or post will sometimes effect a cure. When the horse finds that he is pretty severely pricked, he will not long continue to punish himself. In confirmed cases it may be necessary to have recourse to the log, but the legs are often not a little bruised by it. A rather long and heavy piece of wood attached to a chain has been buckled above the hock, so as to reach about half-way down the leg. When the horse attempts to kick violently, his leg will receive a severe blow: this, and the repetition of it may, after a time, teach him to be quiet.

A much more serious vice is kicking in harness. From the least annoyance about the rump or quarters, some horses will kick at a most violent rate, and destroy the bottom of the chaise, and endanger the limbs of the driver. Those that are fidgety in the stable are most apt to do this. If the reins should perchance get under the tail, the violence of the kicker will often be most outrageous; and while the animal presses down his tail so tightly that it is almost impossible to extricate the reins, he continues to plunge until he has demolished every thing behind him.

This is a vice standing foremost in point of danger, and which no treatment will always conquer. It will be altogether in vain to try coercion. If the shafts are very strong and without flaw, or if they are plated with iron underneath, and a stout kicking-strap resorted to which will barely allow the horse the proper use of his hind limbs in progression, but not permit him to raise them sufficiently for the purpose of kicking, he may be prevented from doing mischief; or, if he is harnessed to a heavy cart, and thus confined, his efforts to lash out will be restrained: but it is frequently a very unpleasant thing to witness these attempt, though ineffectual, to demolish the vehicle, for the shafts or the kicking-strap may possibly break, and extreme danger may ensue. A horse that has once begun to kick, whatever may have been the original cause of it, can never be depended upon again, and he will be very unwise who ventures behind him. The man, however, who must come within reach of a kicker should come as close to him as possible. The blow may thus become a push, and seldom is injurious.*

Unsteadiness while being Mounted.—When this merely amounts to eagerness to start—very unpleasant, indeed, at times, for many a rider has been thrown from his seat before he was fairly fixed in it—it may be remedied by an active and good horseman. We have known many instances in which, while the elderly, and inactive and fearful man has been making more than one ineffectual attempt to vault into the saddle, the horse has been dancing about to his annoyance and danger; but the animal had no sooner been transferred to the management of a younger and more agile rider than he became perfectly subdued. Severity will here, more decidedly than in any other case, do harm. The rider should be fearless—he should carelessly and confidently approach the horse, mount at the first effort, and then restrain him for a while; patting him, and not suffering him to proceed until he becomes perfectly quiet.

* See Rarey's Method of correcting this and other vices, at page 35.

Horses of this kind should not be too highly fed, and should have sufficient daily exercise.

When the difficulty of mounting arises, not from eagerness to start, but unwillingness to be ridden, the sooner that horse is disposed of the better. He may be conquered by a skillful and determined horseman, but even he will not succeed without frequent and dangerous contests that will mar all the pleasure of the ride.

Rearing.—This sometimes results from playfulness, carried indeed to an unpleasant and dangerous extent; but it is oftener a desperate and occasionally successful effort to unhorse the rider, and consequently a vice. The horse that has twice decidedly and dangerously reared, should never be trusted again, unless, indeed, it was the fault of the rider, who had been using a deep curb and a sharp bit. Some of the best horses will contend against these, and then rearing may be immediately and permanently cured by using a snaffle-bridle alone.

The horse-breaker's remedy, that of pulling the horse backward on a soft piece of ground, should be practiced by reckless and brutal fellows alone. Many horses have been injured in the spine, and others have broken their necks, by being thus suddenly pulled over; while even the fellow who fears no danger, is not always able to extricate himself from the falling horse. If rearing proceeds from vice, and is unprovoked by the bruising and laceration of the mouth, it fully partakes of the inveteracy which attends the other divisions of restiveness.

Running Away.—Some headstrong horses will occasionally endeavor to bolt with the best rider. Others with their wonted sagacity endeavor thus to dislodge the timid or unskillful one. Some are hard to hold, or bolt only during the excitement of the chase; others will run away, prompted by a vicious propensity alone. There is no certain cure here. The method which affords any probability of success is, to ride such a horse with a strong curb and sharp bit; to have him always firmly in hand; and, if he will run away, and the place will admit of it, to give him (sparing neither curb, whip, nor spur) a great deal more running than he likes.

Vicious to Clean.—It would scarcely be credited to what an extent this exists in some horses that are otherwise perfectly quiet. It is only at great hazard that they can be cleansed at all. The origin of this is probably some maltreatment. There is, however, a great difference in the sensibility of the skin in different horses. Some seem as if they could scarcely be made to feel the whip, while others cannot bear a fly to light on them without an expression of annoyance. In young horses the skin is peculiarly delicate. If they have been curried with a broken comb, or hardly rubbed with an uneven brush, the recollection of the torture they have felt makes them impatient, and even vicious, during every succeeding operation of the kind. Many grooms, likewise, seem to delight in producing these exhibitions of uneasiness and vice; although, when they are carried a little too far, and at the hazard of the limbs of the groom, the animals that have been almost tutored into these expressions of irritation are brutally kicked and punished.

This, however, is a vice that may be conquered. If the horse is dressed with a lighter hand, and wisped rather than brushed, and the places where the skin is most sensitive are avoided as much as thorough cleanliness will allow, he will gradually lose the recollection of former ill-treatment, and become tractable and quiet.

Vicious to Shoe.—The correction of this is more peculiarly the business of the smith; yet the master should diligently concern himself with it, for it is oftener the consequence of injudicious or bad usage than of natural vice. It may be expected that there will be some difficulty in shoeing a horse for the first few times. It is an operation that gives him a little uneasiness. The man to whom he is most accustomed should go with him to the forge; and if another and steady horse is shod before him, he may be induced more readily to submit. It cannot be denied that, after the habit of resisting this necessary operation is formed, force may be sometimes necessary to reduce our rebellious servant to obedience; but we unhesitatingly affirm that the majority of horses *vicious to shoe* are rendered so by harsh usage, and by the pain of correction being added to the uneasiness of shoeing. It should be a rule in every forge that no smith should be permitted to strike a horse, much less to twitch or to gag him, without the master-farrier's order; and that a young horse should never be twitched or struck. There are few horses that may not be gradually rendered manageable for this purpose by mildness and firmness in the operator. They will soon understand that no harm is meant, and they will not forget their usual habit of obedience; but if the remembrance of corporal punishment is connected with shoeing, they will always be fidgety, and occasionally dangerous.

Swallowing Without Grinding.—Horses have many unpleasant habits in the stable and on the road, which cannot be said to amount to vice, but which materially lessen their value.

Some greedy horses habitually swallow their grain without properly grinding it, and the power of digestion not being adequate to the dissolving of the husk, no nutriment is extracted, and the oats are voided whole. This is particularly the case when horses of unequal appetite feed from the same manger. The greedy one, in his eagerness to get more than his share, bolts a portion of his grain whole. If the farmer, without considerable inconvenience, could contrive that every horse shall have his separate division of the manger, the one of smaller appetite and slower feed would have the opportunity of grinding at his leisure, without the fear of the greater share being stolen by his neighbor.

Some horses, however, are naturally greedy feeders, and will not, even when alone, allow themselves time to chew or grind their grain. In consequence of this they carry but little flesh, and are not equal to severe work. If the rack was supplied with hay when the grain was put into the manger, they will continue to eat on, and their stomachs will become distended with half-chewed and indigestible food. In consequence of this they will be incapable of considerable exertion for a long time after feeding, and, occasionally, dangerous symptoms of staggers will occur.

The remedy is, not to let such horses fast too long. The nosebag should be the companion of every considerable journey The food should likewise be of such a nature that it cannot be rapidly bolted. Chaff should be plentifully mixed with the grain, and, in some cases, and especially in horses of slow work, it should, with the grain, constitute the whole of the food. This will be treated on more at large under the article "Feeding."

In every case of this kind the teeth should be carefully examined. Some of them may be unduly lengthened, particularly the first of the grinders; or they may be ragged at the edges, and may abrade and wound the cheek. In the first place the horse cannot properly masticate his food; in the latter he will not; for these animals, as too often happens in sore-throat, would rather starve than put themselves to much pain.

Crib-Biting.—This is a very unpleasant habit, and a considerable defect, although not so serious a one as some have represented. The horse lays hold of the manger with his teeth, violently extends his neck, and then, after some convulsive action of the throat, a slight grunting is heard, accompanied by a sucking or drawing in of air. It is not an effort at simple eructation, arising from indigestion. It is the inhalation of air. It is that which takes place with all kinds of diet, and when the stomach is empty as well as when it is full.

The effects of crib-biting are plain enough. The teeth are injured and worn away, and that, in an old horse, to a very serious degree. A considerable quantity of grain is often lost, for the horse will frequently crib with his mouth full of it, and the greater part will fall over the edge of the manger. Much saliva escapes while the manger is thus forcibly held, the loss of which must be of serious detriment in impairing the digestion. The crib-biting horse is notoriously more subject to colic than other horses, and to a species difficult of treatment and frequently dangerous. Although many a crib-biter is stout and strong, and capable of all ordinary work, these horses do not generally carry so much flesh as others, and have not their endurance. On these accounts crib-biting has very properly been decided to be unsoundness. We must not look to the state of the disease at the time of purchase. The question is, does it exist at all? A case was tried before Lord Tenterden, and thus decided: "a horse with crib-biting is unsound."

It is one of those tricks which are exceedingly contagious. Every companion of a crib-biter in the same stables is likely to acquire the habit, and it is the most inveterate of all habits. The edge of the manger will in vain be lined with iron, or with sheep-skin, or with sheep-skin covered with tar or aloes, or any other unpleasant substance. In defiance of the annoyance which these may occasion, the horse will persist in the attack on his manger. A strap buckled tightly round the neck, by compressing the wind-pipe, is the best means of preventing the possibility of this trick; but the strap must be constantly worn, and its pressure is too apt to produce a worse affection, viz., an irritation in the wind-pipe, which terminates in roaring.

Some have recommended turning out for five or six months; but this has never succeeded except with a young horse, and then rarely. The old crib-biter will employ the gate for the same purpose as the edge of his manger, and we have often seen him galloping across a field for the mere object of having a gripe at a rail. Medicine will be altogether thrown away in this case.

The only remedy is a muzzle, with bars across the bottom; sufficiently wide to enable the animal to pick up his corn and to pull his hay, but not to grasp the edge of the manger. If this is worn for a considerable period, the horse may be tired of attempting that which he cannot accomplish, and for a while forget the habit, but in a majority of cases, the desire of crib-biting will return with the power of gratifying it.

The causes of crib-biting are various, and some of them beyond the control of the proprietor of the horse. It is often the result of imitation; but it is more frequently the consequence of idleness. The high fed and spirited horse must be in mischief if he is not usefully employed. Sometimes, but we believe not often, it is produced by partial starvation, whether in a bad straw-yard, or from unpalatable food. An occasional cause of crib-biting is the frequent custom of grooms, even when the weather is not severe, of dressing them in the stable. The horse either catches at the edge of the manger, or at that of the partition on each side, if he has been turned, and thus he forms the habit of laying hold of these substances on every occasion.

Wind-Sucking.—This bears a close analogy to crib-biting. It arises from the same causes; the same purpose is accomplished; and the same results follow. The horse stands with his neck bent; his head drawn inward; his lips alternately a little opened and then closed, and a noise is heard as if he were sucking. If we may judge from the same comparative want of condition and the flatulence which we have described under the last head, either some portion of wind enters the stomach, or there is an injurious loss of saliva. This diminishes the value of the horse almost as much as crib-biting; it is as contagious, and it is as inveterate. The only remedies, and they will seldom avail, are tying the head up, except when the horse is feeding, or putting on a muzzle with sharp spikes toward the neck, and which will prick him whenever he attempts to rein his head in for the purpose of wind-sucking.

Not Lying Down.—It not uncommonly happens that a horse will seldom or never lie down in the stable. He sometimes continues in apparent good health, and feeds and works well; but generally his legs swell, or he becomes fatigued sooner than another horse. If it is impossible to let him loose in the saddle, or to put him into a spare box, we know not what is to be done. No means, gentle or cruel, will force him to lie down. The secret is that he is tied up, and either has never dared to lie down through fear of the confinement of the halter, or he has been cast in the night and severely injured. If he can be suffered to range the stable, or have a comfortable box in which he may be loose, he will usually lie down the first night. Some few horses, however, will lie down in the stable, and not in a loose box. A fresh, well-made bed, will generally tempt the tired-out horse to refresh himself with sleep.

Overreach.—This unpleasant noise, known also by the term "clicking," arises from the toe of the hind-foot knocking against the shoe of the fore-foot.

If the animal is young, the action of the horse may be materially improved; otherwise nothing can be done, except to keep the toe of the hind foot as short and as round as it can safely be, and to bevel off and round the toe of the shoe, like that which has been worn off by a stumbling horse, and perhaps, to lower the heel of the fore-foot a little.

Pawing.—Some hot and irritable horses are restless even in the stable, and paw frequently and violently. Their litter is destroyed, the floor of the stable broken up, the shoes worn out, the feet bruised, and the legs sometimes sprained. If this habit does not exist to any great extent, yet the stable never looks well. Shackles are the only remedy, with a chain sufficiently long to enable the horse to shift his posture, or move in his stall; but these must be taken off at night, otherwise the animal will seldom lie down. Except, however, the horse possesses peculiar value, it will be better to dispose of him at once, than to submit to the danger and inconvenience that he may occasion.

Quidding.—A horse will sometimes partly chew his hay and suffer it to drop from his mouth. If this does not proceed from irregular teeth, which it will be the business of the veterinary surgeon to rasp down, it will be found to be connected with sore-throat, and then the horse will exhibit some other symptoms of indisposition, and particularly the swallowing of water will be accompanied by a peculiar gulping effort. In this case the disease (catarrh with sore-throat) must be attacked, and the quidding will cease.

Rolling.—This is a very pleasant and perfectly safe amusement for a horse at grass, but cannot be indulged in the stable without the chance of his being dangerously entangled with the collar-rein (halter) and being cast. Yet, although the horse is cast and bruised, and half-strangled, he will roll again on the following night and continue to do so as long as he lives. The only remedy is not a very pleasant one for the horse, nor always quite safe; yet it must be had recourse to, if the habit of rolling is inveterate. "The horse," says Mr. Castley, "should be tied with length enough of halter to lie down, but not to allow of his head resting on the ground; because, in order to roll over, a horse is obliged to place his head quite down upon the ground."

Shying.—We have before briefly treated of the cause of this vice, and observed that while it is often the result of cowardice or playfulness, or want of work, it is at other times the consequence of a defect of sight. It has been remarked, and we believe very truly, that shying is oftener a vice of half or quarter bred horses, than of those who have in them more of the genuine racing blood.

In the treatment of shying, it is of great importance to distinguish between that which is the consequence of defective sight, and what results from fear or newness of objects, or mere affectation or skittishness. For the first, the nature of which we have explained before, every allowance must be made, and care must be taken that the fear of correction is not associated with the imagined existence of some terrifying object. The severe use of the whip and the spur cannot do good here, and are likely to aggravate the vice tenfold. A word half encouraging and half scolding with a slight pressure of the heel or a slight touch of the spur, will tell the horse that there is nothing to fear, and will give him confidence in his rider on a future occasion.

The shying from skittishness or affectation is quite a different affair, and must be conquered—but how? Severity is altogether out of place. If he is forced into contact with the object by dint of correction, the dread of punishment will afterward be associated with that object, and on the next occasion his startings will be more frequent and more dangerous. The way to cure him is to go on, turning as little as possible out of the road, giving a harsh word or two and a gentle touch with the spur, and then taking no more notice of the matter. After a few times, whatever may have been the object which he chose to select as the pretended cause of affright, he will pass it almost without notice.

Under the head *Breaking-in* we described how the colt may be cured of the habit of shying from fear or newness of objects; and if he then is accustomed as much as possible to the objects among which his services will be required, he will not possess this annoying vice when he grows to maturer age.

It is now generally admitted by all riding-masters and colt-breakers, that a great deal more is to be effected by lenient than by harsh treatment. Rewards are found to operate more beneficially than punishments, and therefore the most scientific and practiced riding-masters adopt methods based upon the former.

Let us not be understood to mean that the animal is to receive any encouragement to shy; for by no other expression can be characterized that erroneous and foolish practice of patting the horse or "making much of him," either just before or during the time he evinces shyness. The former is bad, because it draws the attention of the animal to the object he dreads; the latter is worse, because it fills him with the impression either that the object itself is really terrific, or that he has acted right in shying at it, and ought to do so again.

Whether we are approaching the frightful object or the horse is actually shying, "we should let him alone," "we should take no notice whatever of him," neither letting him perceive that we are aware that we are advancing toward any thing he dislikes, nor do more with him while in the act of shying than is necessary for due restraint with a steady hand upon the rein. We may depend upon it, that battling on our part will only serve to augment affright and arouse resistance on his, and that the most judicious course we can pursue is to persevere in mild forbearant usage.

Shying on coming out of the stable is a habit that can rarely or never be cured. It proceeds from the remembrance of some ill-usage or hurt which the animal has received in the act of proceeding from the stable, such as striking his head against a low doorway or entangling the harness.

When the cure, however, is early attempted, it may be so far overcome that it will be unattended with danger or difficulty. The horse should be bridled when led out or in. He should be held short and tight by the head, that he may feel he has not liberty to make a leap, and this of itself is often sufficient to restrain him. Punishment, or a threat of punishment, will be highly improper. It is only timid or high-spirited horses that acquire this habit, and rough usage invariably increases their agitation and terror.

Slipping the Collar or Halter.—This is a trick at which many horses are so clever, that scarcely a night passes without their getting loose. It is a very serious habit, for it enables the horse sometimes to gorge himself with food, to the imminent danger of staggers; or it exposes him, as he wanders about, to be kicked and injured by the other horses, while his restlessness will often keep the whole team awake. If the web of the halter, being first accurately fitted to his neck, is suffered to slip only one way, or a strap is attached to the halter and buckled round the neck, but not sufficiently tight to be of serious inconvenience, the power of slipping the collar will be taken away.

Tripping.—He must be a skillful practitioner or a mere pretender who promises to remedy this habit. If it arises from a heavy forehand, and the fore-legs being too much under the horse, no one can alter the natural frame of the animal; if it proceeds from tenderness of the foot, grogginess, or old lameness, these ailments are seldom cured. Also if it is to be traced to habitual carelessness and idleness, no whipping will rouse the drone. A known stumbler should never be ridden or driven by any one who values his safety or his life. A tight hand or a strong bearing rein are precautions that should not be neglected, although they are generally of little avail; for the inveterate stumbler will rarely be able to save himself, and this tight rein may sooner and farther precipitate the rider. If after a trip the horse suddenly starts forward, and endeavors to break into a short trot or canter, the rider or driver may be assured that others before him have fruitlessly endeavored to remedy the nuisance.

If the stumbler has the foot kept as short, and the toe pared as close as safety will permit, and the shoe is rounded at the toe or has that shape given to it which it naturally acquires in a fortnight, from the peculiar action of such a horse, the animal may not stumble quite so much; or if the disease which produced the habit can be alleviated some trifling good may be done, but in almost every case a stumbler should be got rid of, or put to slow and heavy work. If the latter alternative is adopted, he may trip as much as he pleases, for the weight of the load and the motion of the other horses will keep him upon his legs.

Weaving.—This consists in a motion of the head, neck, and body from side to side, like the shuttle of a weaver passing through the web, and hence the name which is given to this peculiar and incessant and unpleasant action. It indicates an impatient, irritable temper and a dislike to the confinement of the stable. A horse that is thus incessantly on the fret will seldom carry flesh, or be safe to ride or drive. There is no cure for it but the close tying up of the animal, or at least allowing him but one loose rein, except at feeding-time.

SOUNDNESS, AND THE PURCHASE AND SALE OF HORSES.—There are few sources of greater annoyance, both to the purchaser and the seller of the horse, than disputes with regard to the soundness of the animal.

That horse is sound in whom there is no disease, and no alteration of structure that impairs, or is likely to impair, his natural usefulness. The horse is unsound that labors under disease, or has some alteration of structure which does interfere, or is likely to interfere, with his natural usefulness. The term "*natural usefulness*" must be borne in mind. One horse may possess great speed, but is soon knocked up; another will work all day, but cannot be got beyond a snail's pace: a third with a heavy forehand is liable to stumble, and is continually putting to hazard the neck of his rider; another, with an irritable constitution and a loose, washy form, loses his appetite and begins to scour if a little extra work is exacted from him. The term unsoundness must not be applied to either of these; it would be opening far too widely a door to disputation and endless wrangling. The buyer can discern, or ought to know, whether the form of the horse is that which will render him likely to suit his purpose, and he should try him sufficiently to ascertain his natural strength, endurance, and manner of going. Unsoundness, we repeat, has reference only to disease, or to that alteration of structure which is connected with, or will produce disease, and lessen the usefulness of the animal.

These principles will be best illustrated by a brief consideration of the usually supposed appearances or causes of unsoundness.

Broken Knees certainly do not constitute unsoundness, after the wounds are healed, unless they interfere with the action of the joint; for the horse may have fallen from mere accident, or through the fault of the rider, without the slightest damage more than the blemish. No person, however, would buy a horse with broken knees, until he has thoroughly tried him, and satisfied himself as to his form and action.

Capped Hocks may be produced by lying on an unevenly paved stable, with a scanty supply of litter, or by kicking generally, in neither of which cases would they constitute unsoundness, although in the latter they would be an indication of vice; but, in the majority of instances, they are the consequence of sprain, or of latent injury of the hock, and accompanied by enlargement of it, and would constitute unsoundness. A special warranty should always be taken against capped hocks.

Contraction is a considerable deviation from the natural form of the foot, but not necessarily constituting unsoundness. It requires, however, a most careful examination on the part of the purchaser or veterinary surgeon, in order to ascertain that there is no heat about the quarter, or ossification of the cartilage—that the frog, although diminished in size, is not diseased—that the horse does not step short and go as if the foot were tender, and that there is not the slightest trace of lameness. Unless these circumstances, or some of them, are detected, a horse must not be pronounced to be unsound because his feet are contracted; for many horses with strangely contracted feet do not suffer at all in their action. A special warranty, however, should be required where the feet are at all contracted.

Corns manifestly constitute unsoundness. The portion of the foot in which bad corns are situated, will not bear the ordinary pressure of the shoe; and accidental additional pressure from the growing down of the horn or the introduction of dirt or gravel, will cause serious lameness.

They render it necessary to wear a thick and heavy shoe, or a bar-shoe. in order to protect the weakened and diseased part; and they are very seldom radically cured. There may be, however, and frequently is, a difference of opinion as to the actual existence or character of the corn. They are sometimes, too, so slight that they do not diminish the value of the horse, and will disappear on the horse being shod with ordinary skill and care, even without any alteration in the shoe.

Cough.—This is a disease, and consequently unsoundness. However slight may be its degree, and of whatever short standing it may be, although it may sometimes scarcely seem to interfere with the usefulness of the horse, yet a change of stabling or slight exposure to wet and cold, or the least over-exertion, may, at other times, cause it to degenerate into many dangerous complaints. A horse, therefore, should never be purchased with a cough upon him, without a special warranty; or if—the cough not being observed—he is purchased under a general warranty, that warranty is thereby broken. It is not law, that a horse may be returned on breach of the warranty. The seller is not bound to take him back, unless he has contracted so to do; but he is liable to damages. Lord Ellenborough has completely decided this matter. "I have always held," said he, "that a warranty of soundness is broken, if the animal, at the time of sale, had any infirmity upon him that rendered him less fit for present service. It is not necessary that the disorder should be permanent or incurable. While he has a cough, he is unsound, although that may either be temporary or prove mortal."

In deciding on another case, the same judge said, "I have always held it that a cough is a breach of the warranty. On that understanding I have always acted, and think it quite clear." It was argued on the other hand that two-thirds of the horses in London had coughs, yet still the judge maintained that the cough was a breach of warranty. When it was farther argued that the horse had been hunted the day after the purchase, and the cough might have been increased by this, the reply was singular, but, decisive. "There is no proof that he would have got well if he had not been hunted."

Roaring, Wheezing, Whistling, High-blowing, and Grunting, being the result of alteration of structure, or disease in some of the air-passages, and interfering with the perfect freedom of breathing, especially when the horse is put on his speed, without doubt constitute unsoundness. There are decisions to the contrary, which are now universally admitted to be erroneous. Broken-wind is decidedly still more unsoundness.

Crib-Biting.—Although some learned judges have asserted that crib-biting is simply a trick or bad habit, it must be regarded as unsoundness. This unnatural sucking in of the air must, to a certain degree, injure digestion. It must dispose to colic, and so interfere with the strength, usefulness, and health of the horse. Some crib-biters are good goers, but they probably would have possessed more endurance had they not acquired this habit; and it is a fact well established that, as soon as a horse becomes a crib-biter, he, in nine cases out of ten, loses condition. In its very early stage it may be a mere trick—confirmed, it must have produced morbid deterioration. The wear of the front teeth, and the occasional breaking of them, make a horse old before his time, and sometimes render it difficult or impossible for him to graze, when the state of the animal or the convenience of the owner requires that he should be turned out.

Curb constitutes unsoundness while it lasts, and perhaps while the swelling remains, although the inflammation may have subsided; for a horse that has once thrown out a curb is, for a while at least, very liable to do so again, to get lame in the same place on the slightest extra exertion; or, at all events, he would there first fail on extraordinary exertion. A horse, however, is not returnable, although he should spring a curb five minutes after the purchase; for it is done in a moment, and does not necessarily indicate any previous unsoundness or weakness of the part.

Cutting, as rendering a horse liable to serious injury of the legs, and indicating that he is either weak, or has an awkwardness of gait inconsistent with safety, produces, rather than this, unsoundness. Many horses go lame for a considerable period after cutting themselves severely; and others have dropped from the sudden agony, and endangered themselves and their riders. As some doubt, however, exists on this subject, and as it is a very material objection to a horse, cutting, when evident, should have its serious consequences provided against by a special warranty.

Enlarged Glands.—The enlargement of the glands under the jaw has not been so much considered as it ought to have been in our estimate of the soundness of the horse. Simple catarrh will occasionally, and severe affection of the chest will generally, be accompanied by swelling of these glands, which does not subside for a considerable time after the cold or fever has apparently been cured. To slight enlargements of the glands under the jaw much attention need not be paid; but if they are of considerable size, and especially if they are tender, and the glands at the root of the ear partake of the enlargement, and the membrane of the nose is redder than it should be, we should hesitate in pronouncing that horse to be sound. We must consider the swelling as a symptom of disease.

Enlarged Hock.—A horse with enlarged hock is unsound, the structure of this complicated joint being so materially affected that, although the horse may appear for a considerable time to be capable of ordinary work, he will occasionally fail even in that, and a few days' hard work will always lame him.

The Eyes.—That inflammation of the eye of the horse which usually terminates in blindness of one or both eyes, has the peculiar character of receding or disappearing for a time, once or twice, or thrice, before it fully runs its course. The eye, after an attack of inflammation, regains so nearly its former natural brilliancy, that a person even well acquainted with horses will not always recognize the traces of former disease. After a time, however, the inflammation returns, and the result is inevitable. A horse that has had one attack of this complaint is long afterward unsound, however perfect the eye may seem to be, because he carries about with him a disease that will probably again break out, and eventually destroy the sight. Whether, therefore, he may be rejected or not depends on the possibility of proving an attack of inflammation of the eye prior to the purchase. Next to direct evidence of this are appearances about the eye, of which the veterinary surgeon at least ought not to be ignorant. They consist chiefly of a puckering of the lids toward the inner corner of one or both eyes—a difference in the size of the eyes, although perhaps only a slight one, and not discovered except it be looked for—a gloominess of the eye—a dullness of the iris—a little dullness of the transparent part of the eye generally—a minute, faint, dusky spot deep in the eye, and generally with little radiations of white lines proceeding from it. If these symptoms, or the majority of them, existed at the time of purchase, the animal had assuredly been diseased before, and was unsound. Starting has been considered as unequivocal proof. It is usually an indication of defective sight, but it is occasionally a trick. Connected, however, with the appearances just described, it is a very strong corroborative proof.

Lameness, from whatever cause arising, is unsoundness. However temporary it may be, or however obscure, there must be disease which lessens the utility of the horse, and renders him unsound for the time. So says common sense, but there are contradictory decisions on the case. "A horse laboring under a temporary injury or hurt, which is capable of being speedily cured or removed, is not, according to Chief Justice Eyre, an unsound horse; and where a warranty is made that such a horse is sound, it is made without any view to such an injury; nor is a horse so circumstanced within the meaning of the warranty. To vitiate the warranty, the injury the horse had sustained, or the malady under which he labored, ought to be of a permanent nature, and not such as may arise from a temporary injury or accident."

On the contrary, Lord Ellenborough says: "I have always held, and now hold, that a warranty of soundness is broken, if the animal at the time of sale has any infirmity upon him which renders him less fit for present service. It is not necessary that the disorder should be permanent or incurable. While a horse has a cough he is unsound, although it may either be temporary or may prove mortal. The horse in question having been lame at the time of sale, when he was warranted to be sound, his condition subsequently is no defense to the action.* The decision of Mr. Baron Parke, already referred to, confirms this doctrine.

Neurotomy.—A question has arisen how far a horse that has undergone the operation of the division of the nerve of the leg and has recovered from the lameness with which he was before affected, and stands his work well, may be considered to be sound. Chief Justice Best held such a horse to be unsound, and in our opinion there cannot be a doubt about the matter. The operation of neurotomy does not remove the disease causing the lameness, but only the sensation of pain. A horse on whom this operation has been performed may be improved by it—may cease to be lame—may go well for many years; but there is no certainty of this, and he is unsound, within our definition, unless nature gave the nerve for no useful purpose.

Ossification of the Lateral Cartilages constitutes unsoundness, as inter-

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* 4 Campbell. 251, Elton *vs.* Brogden.

fering with the natural expansion of the foot, and, in horses of quick work, almost universally producing lameness.

Pumiced-Foot.—When the union between the horny and sensible laminæ, or little plates of the foot is weakened, and the coffin-bone is let down, and presses upon the sole, and the sole yields to this unnatural weight, and becomes rounded, and is brought in contact with the ground, and is bruised and injured, that horse must be unsound, and unsound forever, because there are no means by which we can raise the coffin-bone again into its place.

Quidding.—If the mastication of the food gives pain to the animal, in consequence of soreness of the mouth or throat, he will drop it before it is perfectly chewed. This, as an indication of disease, constitutes unsoundness. Quidding sometimes arises from irregularity in the teeth, which wound the cheek with their sharp edges; or a protruding tooth renders it impossible for the horse to close his jaws so as to chew his food thoroughly. Quidding is unsoundness for the time; but the unsoundness will cease when the teeth are properly filed, or the soreness or other cause of the imperfect chewing removed.

Quitter is manifestly unsoundness.

Ring-Bone.—Although when the bony tumor is small, and on one side only, there is little or no lameness—and there are a few instances in which a horse with ring-bone has worked for many years without its return—yet from the action of the foot, and the stress upon the part, the inflammation and the formation of bone may acquire a tendency to spread so rapidly, that we must pronounce the slightest enlargement of the pasterns, or around the coronet, to be a cause of unsoundness.

Sand-Crack is manifestly unsoundness. It may, however, occur without the slightest warning, and no horse can be rejected on account of a sand-crack that has sprung after purchase. Its usual cause is too great brittleness of the crust of the hoof; but there is no infallible method of detecting this, or the degree in which it must exist in order to constitute unsoundness. When the horn round the bottom of the foot has chipped off so much that only a skillful smith can fasten the shoe without pricking the horse, or even when there is a tendency in the horn to chip and break in a much less degree than this, the horse is unsound, for the brittleness of the crust is a disease of the part, or it is such an altered structure of it as to interfere materially with the usefulness of the animal.

Spavin.—Bone spavin, comprehending in its largest sense every bony tumor on the hock, is not necessarily unsoundness. If the tumor affects in the slightest degree the action of the horse, it is unsoundness;—even if it does not, it is seldom safe to pronounce it otherwise than unsoundness. But it may possibly be (like splint in the fore-leg) so situated as to have no tendency to affect the action. A veterinary surgeon consulted on the purchase will not always reject a horse because of such a tumor. His evidence on a question of soundness will depend on the facts. The situation and history of the tumor may be such as to enable him to give a decisive opinion in a horse going sound, but not often.

Bog or Blood Spavin is unsoundness, because, although it may not be productive of lameness at slow work, the rapid and powerful action of the hock in quicker motion will produce permanent, yet perhaps not considerable lameness, which can scarcely ever be with certainty removed.

Splint.—It depends entirely on the situation of the bony tumor on the shank-bone, whether it is to be considered as unsoundness. If it is not in the neighborhood of any joint, so as to interfere with its action, and if it does not press upon any ligament or tendon, it may be no cause of unsoundness, although it is often very unsightly. In many cases, it may not lessen the capability and value of the animal.

Stringhalt.—This singular and very unpleasant action of the hind-leg is decidedly an unsoundness. It is an irregular communication of nervous energy to some muscle of the thigh, observable when the horse first comes from the stable, and gradually ceasing on exercise. It has usually been accompanied by a more than common degree of strength and endurance. It must, however, be traced to some morbid alteration of structure or function; and it rarely or never fails to deteriorate and gradually wear out the animal.

Thickening of the Back Sinews.—Sufficient attention is not always paid to the fineness of the legs of the horse. If the flexor tendons have been sprained, so as to produce considerable thickening of the cellular substance in which their sheaths are enveloped, they will long afterward, or perhaps always, be liable to sprain, from causes by which they would otherwise be scarcely affected. The continuance of any considerable thickness around the sheaths of the tendons indicates previous violent sprain. This very thickening will fetter the action of the tendons, and, after much quick work, will occasionally renew the inflammation and the lameness; therefore such a horse cannot be sound. It requires, however, a little discrimination to distinguish this from the *gumminess* or roundness of leg peculiar to some breeds. There should be an evident difference between the injured leg and the other.

Thoroughpin, except it is of great size, is rarely productive of lameness, and therefore cannot be termed unsoundness; but as it is the consequence of hard work, and now and then does produce lameness, the hock should be most carefully examined, and there should be a special warranty against it.

Thrush.—There are various cases on record of actions on account of thrush in horses, and the decisions have been much at variance, or perfectly contradictory. Thrush has not been always considered by legal men as unsoundness. We, however, decidedly so consider it; as being a disease interfering and likely to interfere with the usefulness of the horse. Thrush is inflammation of the lower surface of the inner or sensible frog—and the secretion or throwing out of pus—almost invariably accompanied by a slight degree of tenderness of the frog itself, or of the heel a little above it, and, if neglected, leading to diminution of the substance of the frog, and separation of the horn from parts beneath and underrunning, and the production of fungus and canker, and ultimately a diseased state of the foot, destructive of the present and dangerous to the future usefulness of the horse.

Windgalls.—There are few horses perfectly free from windgalls, but they do not interfere with the action of the fetlock, or cause lameness except when they are numerous or large. They constitute unsoundness only when they cause lameness, or are so large and numerous as to render it likely that they will cause it.

In the purchase of a horse, the buyer usually receives, embodied in the receipt, what is termed a warranty. It should be thus expressed:

"Received of A B two hundred dollars for a gray mare, warranted only five years old, sound, free from vice, and quiet to ride or drive.
"$200. "C D."

A receipt including merely the word "warranted" extends only to soundness; "warranted sound" goes no farther; the age, freedom from vice, and quietness to ride and drive, should be especially named. This warranty comprises every cause of unsoundness that can be detected, or that lurks in the constitution at the time of sale, and to every vicious habit that the animal has hitherto shown. To establish a breach of warranty, and to be enabled to tender a return of the horse and recover the difference of price, the purchaser must prove that it was unsound or viciously disposed at the time of sale. In case of cough, the horse must have been heard to cough immediately after the purchase, or as he was led home, or as soon as he had entered the stable of the purchaser. Coughing, even on the following morning, will not be sufficient; for it is possible that he might have caught cold by change of stabling. If he is lame, it must be proved to arise from a cause that existed before the animal was in the purchaser's possession. No price will imply a warranty, or be equivalent to one; there must be an express warranty. A fraud must be proved in the seller, in order that the buyer may be enabled to return the horse or maintain an action for the price. The warranty should be given at the time of sale. A warranty, or a promise to warrant the horse given at any period antecedent to the sale, is invalid, for horse-flesh is a very perishable commodity, and the constitution and usefulness of the animal may undergo a considerable change in the space of a few days. A warranty after the sale is invalid, for it is given without any legal consideration. In order to complete the purchase, there must be a transfer of the animal, or a memorandum of agreement, or the payment of the earnest-money. The least sum will suffice for earnest. No verbal promise to buy or to sell is binding without one of these. The moment either of these is effected, the legal transfer of property or delivery is made, and, whatever may happen to the horse, the seller retains, or is entitled to the money. If the purchaser exercises any act of ownership, by using the animal without leave of the vender, or by having any operation performed, or any medicine given to him, he makes him his own. The warranty of a servant is considered to be binding on the master.

If the horse should be afterward discovered to have been unsound at the time of warranty, the buyer may tender a return of it, and, if it be not taken back, may bring his action for the price; but the seller is not bound to rescind the contract, unless he has agreed so to do.

Although there is no legal compulsion to give immediate notice to the seller of the discovered unsoundness, it will be better to have it done.

The animal should then be tendered at the house or stable of the vender. If he refuses to receive him, the animal may be sent to a livery-stable and sold, and an action for the difference in price may be brought. The keep, however, can be recovered only for the time that necessarily intervened between the tender and the determination of the action. It is not legally necessary to tender a return of the horse as soon as the unsoundness is discovered. The animal may be kept for a reasonable time afterward, and even proper medical means used to remove the unsoundness; but courtesy, and indeed justice, will require that the notice should be given as soon as possible. Although it is stated, on the authority of Lord Loughborough, that "no length of time elapsed after the sale will alter the nature of a contract originally false," yet it seems to have been once thought it was necessary to the action to give notice of the unsoundness in a reasonable time. The cause of action is certainly complete on breach of the warranty.

It used to be supposed that the buyer had no right to have the horse medically treated, and that he would waive the warranty by doing so. The question, however, would be, has he injured or diminished the value of the horse by this treatment? It will generally be prudent for him to refrain from all medical treatment, because the means adopted, however skillfully employed, may have an unfortunate effect, or may be misrepresented by ignorant or interested observers.

The purchaser possibly may like the horse, notwithstanding his discovered defect, and he may retain, and bring his action for the depreciation in value on account of the unsoundness. Few, however, will do this, because his retaining the horse will cause a suspicion that the defect was of no great consequence, and will give rise to much cavil about the quantum of damages, and, after all, very slight damages will probably be obtained. "I take it to be clear law," says Lord Eldon, "that if a person purchases a horse that is warranted, and it afterward turns out that the horse was unsound at the time of warranty, the buyer may, if he pleases, keep the horse, and bring an action on the warranty; in which he will have a right to recover the difference between the value of a sound horse and one with such defects as existed at the time of warranty; or he may return the horse, and bring an action to recover the full money; but, in the latter case, the seller has a right to expect that the horse shall be returned to him in the same state he was when sold, and not by any means diminished in value; for if a person keep a warranted article for any length of time after discovering its defects, and when he returns it, it is in a worse state than it would have been if returned immediately after such discovery, I think the party can have no defense to an action for the price of the article on the ground of non-compliance with the warranty, but must be left to his action on the warranty to recover the difference in the value of the article warranted, and its value when sold.*

Where there is no warranty, an action may be brought on the ground of fraud; but this is very difficult to be maintained, and not often hazarded. It will be necessary to prove that the dealer knew the defect,

* Curtis *vs.* Hannay, 3 Esp. 83

and that the purchaser was imposed upon by his false representation, or other fraudulent means. If the defect was evident to every eye, the purchaser has no remedy—he should have taken more care; but if a warranty was given, that extends to all unsoundness, palpable or concealed. Although a person should ignorantly or carelessly buy a blind horse, warranted sound, he may reject it—the warranty is his guard, and prevents him from so closely examining the horse as he otherwise would have done; but if he buys a blind horse, thinking him to be sound, and without a warranty, he has no remedy. Every one ought to exercise common circumspection and common sense.

A man should have a more perfect knowledge of horses than falls to the lot of most, and a perfect knowledge of the vender too, who ventures to buy a horse without a warranty.

If a person buys a horse warranted sound, and discovering no defect in him, and, relying on the warranty, resells him, and the unsoundness is discovered by the second purchaser, and the horse returned to the first purchaser, or an action commenced against him, he has his claim on the first seller, and may demand of him not only the price of the horse, or the difference in value, but every expense that may have been incurred.

Absolute exchanges, of one horse for another, or a sum of money being paid in addition by one of the parties, stand on the same ground as simple sales. If there is a warranty on either side, and that is broken, an action may be maintained: if there be no warranty, deceit must be proved.

The trial of horses on sale often leads to disputes. The law is perfectly clear, but the application of it, as in other matters connected with horse-flesh, attended with glorious uncertainty. The intended purchaser is only liable for damage done to the horse through his own misconduct. The seller may put what restriction he chooses on the trial, and takes the risks of all accidents in the fair use of the horse within such restrictions.

If a horse from a dealer's stable is galloped far and fast, it is probable that he will soon show distress; and if he is pushed farther, inflammation and death may ensue. The dealer rarely gets recompensed for this; nor ought he, as he knows the unfitness of his horse, and may thank himself for permitting such a trial; and if it should occur soon after the sale, he runs the risk of having the horse returned, or of an action for its price.

It is proper, however, to put a limit to what has been too frequently asserted from the bench, that a horse warranted sound must be taken as fit for immediate use, and capable of being immediately put to any fair work the owner chooses. A hunter honestly warranted sound is certainly warranted to be in immediate condition to follow the hounds. The mysteries of condition, as has been shown in a former part of the work, are not sufficiently unraveled.

One of the regulations of the Bazaar in King Street was exceedingly fair, both with regard to the previous owner and the purchaser, viz.—

"When a horse, having been warranted sound, shall be returned within the prescribed period, on account of unsoundness, a certificate from a veterinary surgeon, particularly describing the unsoundness, must accompany the horse so returned; when, if it be agreed to by the veterinary surgeon of the establishment, the amount received for the horse shall be immediately paid back; but if the veterinary surgeon of the establishment should not confirm the certificate, then, in order to avoid further dispute, one of the veterinary surgeons of the college shall be called in, and his decision shall be final, and the expense of such umpire shall be borne by the party in error."

DISEASES OF THE HORSE AND THEIR TREATMENT.—This work, not being prepared for the veterinary practitioner, but for all horse owners, our aim, therefore, in arranging this part of it will be to make them acquainted with the causes, nature, and remedies of the diseases of the horse, so that they may avoid the causes, detect the existence of disease, and themselves apply the remedies, or secure their application by experienced persons.

It may be readily supposed that the animal doomed to the manner of living which every variety of the horse experiences, will be peculiarly exposed to numerous forms of suffering; every natural evil will be aggravated, and many new and formidable sources of pain and death will be superadded.

The principal diseases of the horse are connected with the circulatory system. From the state of habitual excitement in which the animal is kept, in order to enable him to execute his task, the heart and blood-vessels will often act too impetuously; the vital fluid will be hurried along too rapidly, either through the frame generally, or some particular part of it, and there will be *congestion*, accumulation of blood in that part, or *inflammation*, either local or general, disturbing the functions of some organ, or of the whole frame.

Congestion.—Take a young horse on his first entrance into the stables; feed him somewhat highly, and what is the consequence? He has swellings of the legs, or inflammation of the joints, or perhaps of the lungs. Take a horse that has lived somewhat above his work, and gallop him to the top of his speed: his nervous system becomes highly excited—the heart beats with fearful rapidity—the blood is pumped into the lungs faster than they can discharge it—the pulmonary vessels become gorged, fatigued, and utterly powerless—the blood, arrested in in its course, becomes viscid, and death speedily ensues. We have but one chance of saving our patient—the instantaneous and copious extraction of blood; and only one means of preventing the recurrence of this dangerous state; namely, not suffering too great an accumulation of the sanguineous fluid by over-feeding, and by regular and systematic exercise, which will inure the circulatory vessels to prompt and efficient action when they are suddenly called upon to exert themselves. This is an extreme case, but the cause and the remedy are sufficiently plain.

Again, the brain has functions of the most important nature to discharge, and more blood flows through it than through any other portion of the frame of equal bulk. In order to prevent this organ from being oppressed by a too great determination of blood to it, the vessels although numerous, are small, and pursue a very circuitous and winding course. If a horse highly fed and full of blood is suddenly and sharply exercised, the course of the blood is accelerated in every direction, and to the brain among other parts. The vessels that ramify on its surface, or penetrate its substance, are completely distended and gorged with it; perhaps they are ruptured, and the effused blood presses upon the brain; it presses upon the origins of the nerves, on which sensation and motion depend, and the animal suddenly drops powerless. A prompt and copious abstraction of blood; or, in other words, a diminution of this pressure, can alone save the patient. Here is the nature, the cause, and the treatment of *apoplexy.*

Sometimes this disease assumes a different form. The horse has not been performing more than his ordinary work, or perhaps he may not have been out of the stable. He is found with his head drooping and his vision impaired. He is staggering about. He falls, and lies half unconscious, or he struggles violently and dangerously. There is the same congestion of blood in the head, the same pressure on the nervous organs, but produced by a different cause. He has been accustomed habitually to overload his stomach, or he was, on the previous day, kept too long without his food, and then he fell ravenously upon it, and ate until his stomach was completely distended and unable to propel forward its accumulated contents. Thus distended, its blood-vessels are compressed, and the circulation through them is impeded or altogether suspended. The blood is still forced on by the heart, and driven in accumulated quantity to other organs, and to the brain among the rest, and there congestion takes place, as just described, and the animal becomes sleepy, unconscious, and if he is not speedily relieved, he dies. This, too, is apoplexy: the horseman calls it *stomach staggers.* Its cause is improper feeding. The division of the hours of labor, and the introduction of the *nose-bag*, have much diminished the frequency of its occurrence. The remedies are plain: bleeding, physicking, and the removal of the contents of the stomach by means of a pump contrived for that purpose.

Congestions of other kinds occasionally present themselves. It is no uncommon thing for the blood to loiter in the complicated vessels of the *liver*, until the covering of that viscus has burst, and an accumulation of coagulated black blood has presented itself. This congestion constitutes the *swelled legs* to which so many horses are subject when they stand too long idle in the stable; and it is a source of many of the accumulations of serous fluid in various parts of the body, and particularly in the chest, the abdomen, and the brain.

Inflammation is opposed to *congestion*, as consisting in an active state of the capillary arterial vessels; the blood rushes through them with far greater rapidity than in health, from the excited state of the nervous system by which they are supplied.

Inflammation is either *local* or *diffused.* It may be confined to one organ, or a particular portion of that organ; it may involve many neighboring ones, or it may be spread over the whole frame. In the latter case it assumes the name of *fever.* Fever is general or constitutional inflammation, and it is said to be *sympathetic* or *symptomatic* when it can be traced to some local affection or cause, and *idiopathic* when we cannot so trace it. The truth probably is, that every fever has its local cause; but we have not a sufficient knowledge of the animal economy to discover that cause.

Inflammation may be considered with reference to the membranes which it attacks.

The *mucous membranes* line all the cavities that communicate with the external surface of the body. There is frequent inflammation of the membrane of the mouth. *Blain*, or *Glysynthrax*, is a vesicular enlargement which runs along the side of the tongue. Its cause is unknown. It should be lanced freely and deeply, and some aperient medicine administered. *Barbs*, or *paps*, are smaller enlargements, found more in the neighborhood of the bridle of the tongue. They should never be touched with any instrument: a little cooling medicine will generally remove them. *Lampas* is inflammation of the palate, or enlargement of the bars of the palate. The roof of the mouth may be slightly lanced, or a little aperient medicine administered; but the sensibility of the mouth should never be destroyed by the application of the heated iron. *Canker and wounds in the mouth*, from various causes, will be best remedied by diluted tincture of myrrh, or a weak solution of alum.

Foreign Bodies in the Gullet may be generally removed by means of the probang used in the hove of cattle; or the œsophagus may be opened, and the obstructing body taken out.

It is on the mucous membranes that *poisons* principally exert their influence. The *yew* is the most frequent vegetable poison. The horse may be saved by timely recourse to equal parts of vinegar and water ejected into the stomach, after the poison has been as much as possible removed by means of the stomach-pump. For arsenic or corrosive sublimate there is rarely any antidote.

Spasmodic Colic is too frequently produced by exposure to cold, the drinking of cold water, or the use of too much green food. The horse should be walked about, strong friction used to the belly, and spirit of turpentine given in doses of two ounces, with an ounce each of laudanum and spirit of nitrous ether, in warm water, ale, or gruel. If the spasm is not soon relieved, the animal should be bled, and injections of warm water with a solution of aloes thrown up, if constipation exists. This spasmodic action of the bowels, when long continued, is liable to produce *introsusception*, or *entanglement*, of them; and the case is then hopeless.

Superpurgation often follows the administration of a too strong or improper dose of physic. The torture which it produces will be evident by the agonized expression of the countenance, and the frequent looking at the flanks. Plenty of thin starch or arrowroot should be given both by the mouth and by injection; and, twelve hours having passed without relief being experienced, chalk, catechu, and opium should be added to the gruel.

Worms in the intestines are not often productive of much mischief, except they exist in very great quantities. Small doses of emetic tartar or calomel, with a little ginger, may be given to the horse half an hour before his first meal, in order to expel the round white worm; it must be worked off with linseed-oil or aloes, and injections of linseed-oil or aloes will usually remove the ascarides, or needle-worms.

The Respiratory Passages are all lined by the mucous membrane. *Catarrh*, or *cold*, inflammation of the upper air-passages, should never be long neglected. A few mashes or a little medicine will usually remove it. If it is neglected, and occasionally in defiance of all treatment, it will degenerate into other diseases. The larynx may become the principal seat of inflammation. *Laryngitis* will be shown by extreme difficulty of breathing, accompanied by a strange roaring noise, and an evident enlargement and great tenderness of the larynx when felt externally. The windpipe must be opened in such case, and the best advice will be necessary. Sometimes the subdivisions of the trachea, before or when it first enters the lungs, will be the part affected, and we have *bronchitis*. This is characterized by a quick and hard breathing, and a peculiar wheezing sound, with the coughing up of mucus. Here, too, decisive measures must be adopted, and a skillful practitioner employed. His assistance is equally necessary in *distemper*, *influenza*, and *epidemic catarrh*, names indicating varieties of the same disease, and the product of atmospheric influence; differing to a certain degree in every season, but in all characterized by intense inflammation of the mucous surfaces, and rapid and utter prostration of strength, and in all demanding the abatement of that inflammation, and yet little expenditure of vital power.

Cough may degenerate into *inflammation of the lungs;* or this fearful malady may be developed without a single premonitory symptom, and prove fatal in twenty-four or even in twelve hours. It is mostly characterized by deathly coldness of the extremities, expansion of the nostril, redness of its lining membrane, singularly anxious countenance, constant gazing at the flank, and an unwillingness to move. A successful treatment of such a case can be founded only on the most prompt and fearless and decisive measures; the lancet should be freely used. Counter-irritants should follow as soon as the violence of the disease is in the slightest degree abated; sedatives must succeed to them; and fortunate will he be who often saves his patient after all the decisive symptoms of pneumonia are once developed.

The diseases of the lungs have been recently carefully investigated, and we are enabled to detect three important varieties in the inflammatory affections of the lungs and chest, viz., congestive inflammation of the lungs, or *pulmonary apoplexy*—*pneumonia*, or true inflammation of the lungs—and *pleurisy*, or pleuritis. The first consists in the distention of the small vessels of the lungs with dark venous blood, and is generally produced by over-exertion, particularly if the animal, when attacked, is not in proper condition for work. The symptoms are rapid breathing, cold extremities, and short duration of the disease, ending either in death or recovery. When death supervenes, the lungs are black. With regard to treatment, bleeding should be adopted if the pulse is distinct as well as rapid; if not, a diffusible stimulant should first be given and bleeding should follow.

True pneumonia is longer in its duration, but the symptoms are often obscure at first. There is considerable distress, but there does not appear to be any active pain; and in this respect it may generally be distinguished from *pleurisy*. The pulse is full, strong, and rapid—pain, sometimes acute, but varying from time to time, and the blood presenting a considerable quantity of buff, or fibrine. The tendencies of the disease are either the deposition of water in the chest, or else fibrous flakes, and sometimes both conjoined.

Sometimes pneumonia and pleurisy are combined together, causing *pleuropneumonia*, and then the danger is increased at the same time, as the symptoms are rendered more obscure.

Blood-letting is one of the first of our remedial measures for these diseases, but is called for in a more marked degree in pleurisy than in pneumonia. The pulse, however, in both cases must be our guide as to the quantity to be taken; and, as stated in the text, a decided effect should be obtained. Repetition of bleeding, too, may be had recourse to with greater freedom, in pleurisy than in pneumonia. In the latter disease, we must take care that we do not shipwreck the vital powers by repeated and too copious bleeding, or mistake the effects produced by bleeding for the symptoms of the disease itself. It is only by the conjoint aids of science and experience that these nice discriminations can be made; it is therefore the height of folly for the inexperienced owner to attempt to treat such cases himself.

When pleurisy and pneumonia are combined, the symptoms, though extremely severe, are yet very obscure, and the chances of successful treatment are much diminished. The water in the chest spoken of in the text, is the termination of pleurisy, and becomes fatal in a majority of cases (particularly if, in addition to this serous fluid, flakes of lymph are also thrown out.) In some cases where water in the chest has supervened early, and the inflammation has otherwise subsided, relief has been obtained by tapping.

We have little to add with regard to the treatment of these inflammatory diseases, except that we do not approve of many repeated bleedings. It is rarely the case that more than one bleeding is desirable, but this in general should be very copious. The best guide as to the propriety of bleeding is the strength of the pulse and not its frequency. If some hours after the first bleeding the pulse is still strong and full, as well as quick, then bleeding is most probably called for again, and more particularly if the blood has exhibited a thick buffy coat. If the first bleeding has exhibited no buff on the surface, then a repetition of bleeding is rarely demanded. Aloes should be always eschewed, and diuretics should not be continued after twelve drachms, or two ounces of nitre or resin have been taken. We have also found very good effects from the administration of small doses of calomel and opium, twice a day, two scruples of the former, and one of the latter, being sufficient for a dose; and we have also found an ounce or two of the spirit of nitrous ether very serviceable in the early stage of the disease, particularly if the legs and ears are cold.

Among the consequences of these severe affections of the lungs, are *chronic cough*, not always much diminishing the usefulness of the horse, but strangely aggravated at times by any fresh accession of catarrh, and too often degenerating into *thick wind*, which always materially interferes with the speed of the horse, and in a great proportion of cases terminates in broken wind. It is rare, indeed, that either of these diseases admits of cure. That obstruction in some part of the respiratory canal, which varies in almost every horse, and produces the peculiar sound termed *roaring*, is also rarely removed. There are as many degrees or intonations of roaring, as there are notes on the gamut; and those notes ascend from piano to forte. This renders it difficult in some slight cases to decide positively whether a horse is a roarer or not; and good judges may be mistaken. The state of the animal very frequently occasions an impediment to an accurate decision; if he be in very plethoric condition, he will not unfrequently give slight indications of roaring; but when he is divested of that superabundance of fat, all the disagreeable symptoms disappear. The usual test of startling the animal, is by no means an infallible criterion, neither is the stethoscope in all cases to be relied upon. There is but one positive mode of determining the question; the animal being in a proper condition, he must be ridden and tried in all his paces. With stallions this proof is not often practicable; and unless they are badly affected, it is often impossible to prove that they are roarers.

Glanders, the most destructive of all the diseases to which the horse is exposed, is *the consequence of breathing the atmosphere of foul and vitiated stables.* It is the winding up of almost every other disease, and in every stage it is most contagious. Its most prominent symptoms are a small but constant discharge of sticky matter from the nose; an enlargement and induration of the glands beneath and within the lower jaw, on one or both sides, and, before the termination of the disease, chancrous inflammation of the nostril on the same side with the enlarged gland. Its contagiousness should never be forgotten, for if a glandered horse is once introduced into a stable, almost every inhabitant of that stable will sooner or later become infected and die.

If some persons underrate the danger, it is because the disease may remain unrecognized in the infected horse for some months, or even years, and therefore, when it appears, it is attributed to other causes, or to after-inoculation. No glandered horse should be employed on any farm, nor should a glandered horse be permitted to work on any road, or even to pasture on any field. He should be destroyed.

In a well settled case of glanders it is not worth while, except by way of experiment at a veterinary school, to attempt any remedies. The chances of cure are too remote, and the danger of infection too great.

The contagious nature of glanders is very well known, and not only is it so with regard to the horse, but it is capable of being communicated to the human being; and, indeed, there have been very many deaths from this cause, and most horrible deaths they are. It is generally by means of some cut or abrasion which comes in contact with the glandered matter that the infection is communicated. The utmost caution should therefore be exercised by the attendants; and it is most unpardonable to keep glandered horses any length of time for the sake of their work; and we are scarcely justified in tampering long with them under the idea of effecting a cure, when the cases are decidedly glandered.

The urinary and genital organs are also lined by mucous membranes. The horse is subject to inflammation of the kidneys from eating musty oats or mow-burnt hay, from exposure to cold, injuries of the loins, and the imprudent use of diuretics. Bleeding, physic and counter-irritants over the region of the loins should be had recourse to. Diabetes or profuse staling is difficult to treat. The inflammation that may exist should first be subdued, and then opium, catechu, and the *Uva ursi* administered. Inflammation of the bladder will be best alleviated by mucilaginous drinks of almost any kind, linseed-gruel taking precedence of all others. Inflammation of the neck of the bladder, evinced by the frequent and painful discharge of small quantities of urine will yield only to the abstraction of blood and the exhibition of opium. A catheter may be easily passed into the bladder of the mare and urine evacuated; but it will require a skillful veterinary surgeon to effect this in the horse. A stone in the bladder is readily detected by the practitioner, and may be extracted with comparative ease. The sheath of the penis is often diseased from the presence of corrosive mucous matter. This may easily be removed with warm soap and water.

To the mucous membranes belong the conjunctival tunic of the eye; and the diseases of the eye generally may be here considered. A scabby itchiness on the edge of the eyelid may be cured by a diluted nitrated ointment of mercury. Warts should be cut off with the scissors and the roots touched with lunar caustic. Inflammation of the haw should be abated by the employment of cooling lotions, but that useful defense of the eye should never if possible be removed. Common ophthalmia will yield as readily to cooling applications as inflammation of the same organ in any other animal; but there is another species of inflammation, commencing in the same way as the first, and for a while apparently yielding to treatment, but which changes from eye to eye, and returns again and again, until blindness is produced in one or both organs of vision. The most frequent cause is hereditary predisposition. The reader cannot be too often reminded that the qualities of the sire, good or bad, descend, and scarcely changed, to his offspring. How moon-blindness was first produced no one knows; but its continuance in our stables is to be traced to this cause principally, or almost alone; and it pursues its course until cataract is produced for which there is no remedy. *Gutta serena* (palsy of the optic nerve) is sometimes observed, and many have been deceived, for the eye retains its perfect transparency. Here also medical treatment is of no avail.

The serous membranes are of great importance. The brain and spinal marrow with the origins of the nerves are surrounded by them; so are the heart, the lungs, the intestinal canal, and the organs whose office it is to prepare the generative fluid.

Inflammation of the Brain.—Mad-staggers falls under this division. It is inflammation of the meninges or envelopes of the brain, produced by over-exertion or by any of the causes of general fever, and it is characterized by the wildest delirium. Nothing but the most profuse bloodletting, active purgation and blistering the head will afford the slightest hope of success. *Tetanus*, or *locked jaw*, is a constant spasm of all the voluntary muscles, and particularly those of the neck, the spine and the head, arising from the injury of some nervous fibril—that injury spread ing to the origin of the nerve—the brain becoming affected, and universal and unbroken spasmodic action being the result. Bleeding, physicking, blistering the course of the spine, and the administration of opium in enormous doses, will alone give any chance of cure. *Epilepsy* is not a frequent disease in the horse, but it seldom admits of cure. It is also very apt to return at the most distant and uncertain intervals. *Palsy* is the suspension of nervous power. It is usually confined to the hinder limbs and sometimes to one limb only. Bleeding, physicking, antimonial medicines, and blistering of the spine are most likely to produce a cure; but they too often utterly fail of success. *Rabies*, or madness, is evidently a disease of the nervous system, and once being developed, is altogether without remedy. The utter destruction of the bitten part with the lunar caustic soon after the infliction of the wound, will, however, in a great majority of cases, prevent that development.

Founder.—Founder, when acute, requires a treatment like that of other inflammations, with such differences as the situation of the disease may suggest.

Bleeding is indispensable, and that to its fullest extent. If the disease is confined to the fore-feet, four quarts of blood should be taken as soon as possible from the toe of each; care being taken to open the artery as well as the vein. The feet may likewise be put into warm water, to quicken the flow of the blood, and increase the quantity abstracted. Poultices of linseed meal, made very soft, should cover the whole of the foot and pastern, and be frequently renewed, which will promote evaporation from the neighboring parts, and possibly through the pores of the hoof, and by softening and rendering supple the hoof, will relieve its painful pressure on the swelled and tender parts beneath. More fully to accomplish this last purpose, the shoe should be removed, the sole pared as thin as possible, and the crust, and particularly the quarters, well rasped. All this must be done gently, and with a great deal of patience, for the poor animal can scarcely bear his feet to be meddled with. There used to be occasional doubt as to the administration of physic, from fear of metastasis (shifting) of inflammation which has sometimes occurred, and been generally fatal. When, however, there is so much danger of losing the patient from the original attack, we must run the risk of the other. Sedative and cooling medicines should be diligently administered, consisting of digitalis, nitre, and emetic tartar.

Chronic Founder.—This is a species of founder insidious in its attack, and destructive to the horse. It is a milder form of the preceding disease. There is lameness, but it is not so severe as in the former case. The horse stands as usual. The crust is warm, and that warmth is constant, but it is not often probably greater than in a state of health. The surest symptom is the action of the animal. It is diametrically opposite to that in the navicular disease. The horse throws as much of his weight as he can on the posterior parts of his feet.

The treatment should be similar to that recommended for the acute disease—blood-letting, poultices, fomentations, and blisters, and the last much sooner and much more frequently than in the former disease.

Bog and Blood-Spavin.—Attached to the extremities of most of the tendons, and between the tendons and other parts, are little bags containing a mucous substance to enable the tendons to slide over each other without friction, and to move easily on the neighboring parts. From violent exercise these vessels are liable to enlarge. Windgalls and thoroughpins are instances of this. There is one of them on the inside of the hock at its bending. This sometimes becomes considerably increased in size, and the enlargement is called a *bog-spavin.* A vein passes over the bag, which is pressed between the enlargement and the skin, and the passage of the blood through it is impeded; the vein is consequently distended by the accumulated blood, and the distension reaches from this bag as low down as the next valve. This is called *blood-spavin.* Blood-spavin, then, is the consequence of bog-spavin. It very rarely occurs, and is, in the majority of instances, confounded with bog-spavin.

Blood-spavin does not always cause lameness, except the horse is very hard-worked; but this, as well as bog-spavin, constitutes unsoundness, and materially lessens the value of the horse. The proper treatment is, to endeavor to promote the absorption of the contents of the bag. This may be attempted by pressure long applied. A bandage may be contrived to take in the whole of the hock, except its point; and a compress made of folded linen being placed on the bog-spavin, may confine the principal pressure to that part. It is, however, very difficult to adapt a bandage to a joint which admits of such extensive motion; therefore most practitioners apply two or three successive blisters over the enlargement, when it usually disappears. Unfortunately, however, it returns if any extraordinary exertion is required from the horse.

Strangles.*—This is a disease principally incident to young horses—usually appearing between the fourth and fifth year, and oftener in the spring than in any other part of the year. It is preceded by cough, and can at first scarcely be distinguished from common cough, except that there is more discharge from the nostril, of a yellowish color, mixed with pus, and generally without smell. There is likewise a considerable discharge of ropy fluid from the mouth, and greater swelling than usual under the throat. This swelling increases with uncertain rapidity, accompanied by some fever and disinclination to eat, partly arising from the fever, but more from the pain which the animal feels in the act of mastication. There is considerable thirst, but after a gulp or two the horse ceases to drink, yet is evidently desirous of continuing his draught. In the attempt to swallow, and sometimes when not drinking, a convulsive cough comes on, which almost threatens to suffocate the animal—and thence, probably the name of the disease.

The tumor is under the jaw, and about the center of the channel. It soon fills the whole of the space, and is evidently one uniform body, and may thus be distinguished from glanders, or the enlarged glands of catarrh. In a few days it becomes more prominent and soft, and evidently contains a fluid. This rapidly increases; the tumor bursts, and a great quantity of pus is discharged. As soon as the tumor has broken the cough subsides, and the horse speedily mends, although some degree

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* Usually termed "*Horse distemper*" in the United States.

of weakness may hang about him for a considerable time. Few horses, possibly none, escape its attack; but the disease having passed over, the animal is free from it for the remainder of his life. Catarrh may precede, or may predispose to, the attack, and, undoubtedly, the state of the atmosphere has much to do with it, for both its prevalence and its severity are connected with certain seasons of the year and changes of the weather. There is no preventive for the disease, nor is there any thing contagious about it. Many strange stories are told with regard to this; but the explanation of the matter is, that when several horses in the same form, or in the same neighborhood, have had strangles at the same time, they have been exposed to the same powerful but unknown exciting cause.

As soon as the tumor under the jaw is decidedly apparent, the part should be actively blistered. From the thickness of skin, poultices, fomentations, etc., are of little avail. The blister will also abate the internal inflammation and soreness of the throat, and thus lessen the cough and wheezing.

As soon as the swelling is soft on its summit, and evidently contains matter, it should be freely and deeply lanced. It is a bad, although frequent practice, to suffer the tumor to burst naturally, for a ragged ulcer is formed, very slow to heal and difficult of treatment. If the incision is deep and large enough, no second collection of matter will be formed: and that which is already there may be allowed to run out slowly, all pressure with the fingers being avoided. The part should be kept clean, and a little friar's balsam injected daily into the wound.

The remainder of the treatment will depend on the symptoms. If there is much fever, and evident affection of the chest, and which should carefully be distinguished from the oppression and choking occasioned by the pressure of the tumor, it will be proper to bleed. In the majority of cases, however, bleeding will not only be unnecessary, but injurious. It will delay the suppuration of the tumor, and increase the subsequent debility. A few cooling medicines, as nitre, emetic tartar, and perhaps digitalis, may be given, as the case requires. The appetite, or rather the ability to eat, will return with the opening of the abscess. Bran-mashes, or fresh-cut grass or tares, should be liberally supplied, which will not only afford sufficient nourishment to recruit the strength of the animal, but keep the bowels gently open. If the weakness is not great, no further medicine will be wanted, except a dose of mild physic in order to prevent the swellings or eruptions which sometimes succeed to strangles. In cases of debility, a small quantity of tonic medicine, as chamomile, gentian, or ginger, may be administered.

Poll-Evil.—From the horse rubbing and sometimes striking his poll against the lower end of the manger, or hanging back in the stall and bruising the part with the halter—or from the frequent and painful stretching of the ligaments and muscles by unnecessary tight reining, and, occasionally, from a violent blow on the poll, inflammation ensues, and a swelling appears, hot, tender, and painful. It used to be a disease of frequent occurrence, but it is now, from better treatment of the animal, of comparatively rare occurrence.

It has been stated that the ligament of the neck passes over the atlas, or first bone, without being attached to it, and the seat of inflammation is between the ligament and the bone beneath; and being thus deeply situated, it is serious in its nature and difficult of treatment.

The first thing to be attempted is to abate the inflammation by bleeding, physic, and the application of cold lotions to the part. In a very early period of the case a blister might have considerable effect. Strong purgatives should also be employed. By these means the tumor will sometimes be dispersed. This system, however, must not be pursued too far. If the swelling increases, and the heat and tenderness likewise increase, matter will form in the tumor; and then our object should be to hasten its formation by warm fomentations, poultices, or stimulating embrocations. As soon as the matter is formed, which may be known by the softness of the tumor, and before it has time to spread around and eat into the neighboring parts, it should be evacuated. Now comes the whole art of treating poll-evil; *the opening into the tumor must be so contrived that all the matter shall run out*, and continue afterward to run out as quickly as it is formed, and not collect at the bottom of the ulcer, irritating and corroding it. This can be effected by a seton alone. The needle should enter at the top of the tumor, penetrate through its bottom, and be brought out at the side of the neck, a little below the abscess. Without any thing more than this, except frequent fomentation with warm water, in order to keep the part clean, and to obviate inflammation, poll-evil in its early stage will frequently be cured.

If the ulcer has deepened and spread, and threatens to eat into the ligaments of the joints of the neck, it may be necessary to stimulate its surface, and perhaps painfully so, in order to bring it to a healthy state, and dispose it to fill up. In extreme cases, some highly stimulating application may be employed. All measures, however, will be ineffectual unless the pus or matter is, by the use of setons, perfectly evacuated. The application of these setons will require the skill and anatomical knowledge of the veterinary surgeon. In desperate cases, the wound cannot be fairly exposed to the action of the caustic without the division of the ligament of the neck. This may be effected with perfect safety; for, although the ligament is carried on to the occipital bone, and some strength is gained by this prolongation of it, the main stress is on the second bone; and the head will continue to be supported. The divided ligament, also, will soon unite again, and its former usefulness will be restored when the wound is healed.*

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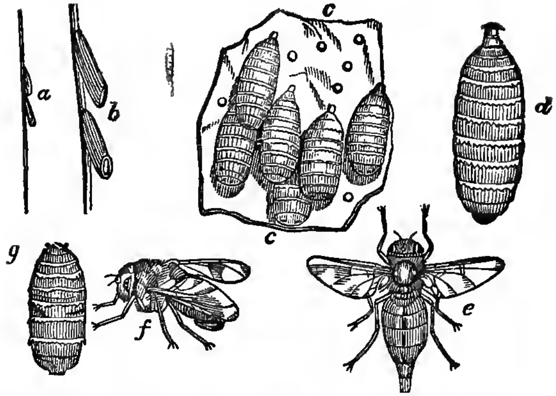
* All cooling applications to the poll-evil are useless, for when once the swelling which constitutes the disease has appeared, we have never known it dispersed, but sooner or later it suppurates. It often takes many months before the matter reaches the surface; but the more complete the suppuration is, the easier it is to effect a cure. The injury, which generally arises from striking the poll against a low doorway, is deep-seated, and the surface of the bone is often diseased from the beginning.

It must be confessed that the poll-evil is very difficult to cure, a difficulty arising not from the character of the injury, but rather from its situation, and the nature of the surrounding parts. When matter forms in any situation, it has a tendency to pass downward, and to seek an exit where the least obstacles are offered to its passage. It consequently forms passages or sinuses (pipes) amongst the muscles, and when these are filled the matter points to the surface. This tendency con-



a and *b*, the eggs of the gad-fly adhering to the hair of the horse; *c*, the appearance of the bots on the stomach, firmly adhering by their hooked mouths. The marks or depressions are seen which are left on the coat of the stomach when the bots are detached from their hold; *d*, the bot detached; *e*, the female of the gad-fly of the horse, prepared to deposit her eggs; *f*, the gad-fly by which the red bots are produced; *g*, the smaller, or red bot.

Bots.—In the spring and early part of the summer, horses are much troubled by a grub or caterpillar, which crawls out of the anus, fastens itself under the tail, and seems to cause a great deal of itching or uneasiness. Grooms are sometimes alarmed at the appearance of these insects. Their history is curious, and will dispel every fear with regard to them. We are indebted to Mr. Bracy Clark for almost all we know of the bot.

A species of gad-fly, *e*, the *œtrus equi*, is in the latter part of the summer exceedingly busy about the horse. It is observed to be darting with great rapidity toward the knees and sides of the animal. The females are depositing their eggs on the hair, and which adhere to it by means of a glutinous fluid with which they are surrounded (*a* and *b*). In a few days the eggs are ready to be hatched, and the slightest application of warmth and moisture will liberate the little animals which they contain. The horse in licking himself touches the egg; it bursts,

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tinues after an external opening is made, and deep sinuses are formed in various directions, rendering it almost impossible to get a depending opening.

The abscess should not be opened till the matter is thoroughly formed, and then a depending opening should be made, through which a seton may be passed. The great error frequently made in the treatment of poll-evil is, that these openings are not made half large enough, so that much of the pus flows in another direction, and there forms sinuses. Now, the chief art in the treatment of this disease is to use the bistoury freely, to lay all the sinuses open as much as possible, and to throw them together; then to make the lower opening extremely large, and as low down as possible—large enough, indeed, for two fingers to be inserted. If the bone is injured, it will be necessary to apply some caustic application, in order to cause a healthy slough. Pressure is found very useful in keeping the sides of the wound together, and preserving the formation of sinuses. With this view, it has been recommended to apply a tight compress, by means of bandages, round the part, but it is extremely inconvenient to apply them, in consequence of the windpipe interfering.—*Spooner.*

and a small worm escapes, which adheres to the tongue, and is conveyed with the food into the stomach. There it clings to the cuticular portion of the stomach, *c*, by means of a hook on either side of its mouth; and its hold is so firm and so obstinate, that it must be broken before it can be detached. It remains there feeding on the mucus of the stomach during the whole of the winter, and until the end of the ensuing spring; when, having attained a considerable size, *d*, and being destined to undergo a certain transformation, it disengages itself from the cuticular coat, is carried into the villous portion of the stomach with the food, passes out of it with the chyme, and is evacuated with the dung.

The *larva*, or maggot, seeks shelter in the ground, and buries itself there; it contracts in size, and becomes then a chrysalis, or grub, in which state it lies inactive for a few weeks, and then, bursting from its confinement, assumes the form of a fly. The female, becoming impregnated, quickly deposits her eggs on those parts of the horse which he is most accustomed to lick, and thus the species is perpetuated.

There are several plain conclusions to be drawn from this history. The bots cannot, while they inhabit the stomach of the horse, give the animal any pain, for they have fastened on the cuticular and insensible coat. They cannot be injurious to the horse, for he enjoys the most perfect health when the cuticular part of his stomach is filled with them, and their presence is not even suspected until they appear at the anus. They cannot be removed by medicine, because they are not in that part of the stomach to which medicine is usually conveyed; and if they were, their mouths are too deeply buried in the mucus for any medicine, that can be safely administered, to affect them; and, last of all, in due course of time they detach themselves, and come away. Therefore the wise man will leave them to themselves, or content himself with picking them off when they collect under the tail and annoy the animal.

The smaller bot, *f* and *g*, is not so frequently found.

Wind-Galls.—In the neighborhood of the fetlock there are occasionally found considerable enlargements, oftener on the hind leg than the fore one, which are denominated wind-galls. Between the tendons and other parts, and wherever the tendons are exposed to pressure or friction, and particularly about their extremities, little bags or sacs are placed, containing, and suffering to ooze slowly from them, a mucous fluid to lubricate (make slippery) the parts. From undue pressure, and that most frequently caused by violent action and straining of the tendons, or often from some predisposition about the horse, these little sacs are injured. They take on inflammation and sometimes become large and hardened. There are few horses perfectly free from them. When they first appear, and until the inflammation subsides, they may be accompanied by some degree of lameness; but otherwise, except when they attain a great size, they do not interfere with the action of the animal, or cause any considerable unsoundness. The farriers used to suppose that they contained wind—hence their name, wind-galls; and hence the practice of opening them, by which dreadful inflammation was often produced, and many a valuable horse destroyed. It is not uncommon for wind-galls entirely to disappear in aged horses.

A slight wind-gall will scarcely be subjected to treatment; but if these tumors are numerous and large, and seem to impede the motion of the limb, they may be attacked first by bandage. The rollers should be of flannel, and soft pads should be placed on each of the enlargements, and bound down tightly upon them. The bandage should also be wetted with the lotion recommended for sprain of the back sinews. The wind-gall will often diminish or disappear by this treatment, but will too frequently return when the horse is again hardly worked. A blister is a more effectual but too often temporary remedy. Wind-galls will return with the renewal of work. Firing is still more certain, if the tumors are sufficiently large and annoying to justify our having recourse to measures so severe; for it will not only effect the immediate absorption of the fluid and the reduction of the swelling, but by contracting the skin will act as a permanent bandage, and therefore prevent the reappearance of the tumor. The iodine and mercurial ointments have occasionally been used with advantage in the proportion of three parts of the former to two of the latter.

The following formulæ may be said to contain most of the remedies necessary for the use of the amateur; when disease prevails, the safest plan is to call in the assistance of a veterinary practitioner.

When calomel or emetic tartar is given for the expulsion of worms, it should be mixed in a small portion of bran mash, after fasting the animal five or six hours; two doses given at similar intervals will be most effective. They must be worked off with linseed oil or aloes, after an equivalent lapse of time; and as alkalies neutralize the effects of either of those medicines, soap must be excluded if the form of ball is preferred.

As an external stimulating application for the throat in cases of inflammation arising from cold or other causes, common mustard, mixed with water as for the table is an excellent remedy, and is equal if not superior to any of the more complicated nostrums.

When cooling remedies are required to the legs, cold water is the best. The introduction of nitre and sal-ammoniac will increase the evaporation; but great care is requisite to renew such medicated lotions very frequently; because when the refrigerating process is over, they become stimulants; thus on ordinary occasions cold water constantly applied with very loose linen bandages is to be preferred.

TABLE SHOWING THE PROPORTIONS OF MEDICINES TO BE GIVEN TO HORSES AT VARIOUS AGES.

	Calomel or Tartarized Antimony. Grains.		Linseed Oil. Ounces.		Aloes. Drachms.	
To foals	10		4 to	6	½ to	¾
Yearlings	15 to	20	6	8	1	1½
Two years old	20	25	8	12	2	2½
Three years old	25	30	12	15	2½	3½
Four years old and upward	30	60	1	2 pts.	4	6

Common Aloetic Purgative.—Aloes finely powdered, four drachms; hard soap and ginger, each two drachms. Mix and form a ball, varying the proportions according to the age and constitution of the horse.

Aloetic Purgative without Soap.—Aloes broken in pieces, four drachms; olive oil or lard, one drachm; ginger in powder, two drachms; treacle, one and a half drachms. The aloes and oil, or lard, must be melted in a jar placed in a saucepan over the fire, and when melted, the ginger and treacle are added. The aloes must not be boiled longer than to effect their solution.

Aloetic Alteratives.—Aloes in fine powders, two drachms; nitre, two drachms; soap, two drachms. Mix and form one ball. To be given daily till a slight action of the bowels is produced.

Antimonial Alterative.—Sulphur and sulphuret of antimony, each two to three drachms. Treacle to form a ball. One of which may be given four, five, or six days in succession.

The preparation necessary before giving aloetic purges should be very scrupulously attended to. Bran mashes must be liberally substituted for hay during the twenty-four hours previous to giving the ball; and the horse requires to be walked out during its operation.

MEDICINES FOR THE HORSE—THEIR ACTION AND DOSES.

NAMES.	ACTION.	DOSE.
Muriatic acid,	Tonic,	1 to 2 drachms
Nitric acid,	Tonic,	1 to 2 drachms.
Sulphuric acid,	Tonic,	1 to 2 drachms.
Gentian,	Tonic,	2 to 4 drachms.
Peruvian bark,	Tonic,	2 to 4 drachms.
Sulphate of iron,	Tonic,	2 to 4 drachms.
Myrrh,	Tonic,	2 to 4 drachms.
Sulphate of zinc,	Tonic astringent,	1 to 2 drachms.
Oxide of zinc,	Tonic,	1 to 2 drachms.
Strychnine,	Tonic for nerves,	1 to 3 grains.
Iodide of iron,	Alterative and tonic,	½ to 1 drachm.
Alum,	Astringent,	2 to 4 drachms.
Nut-galls,	Astringent,	2 to 4 drachms.
Sugar of lead,	Astringent,	½ to 1 drachm.
Iodine,	Alterative,	5 to 10 grains.
Corrosive sublimate,	Alterative,	4 to 6 grains.
Hydriodate of potash,	Alterative,	½ drachm.
Calomel,	Alterative,	10 to 20 grains.
Epsom salts,	Purgative,	½ lb. to 1 lb.
Glauber salts,	Purgative,	½ lb. to 1 lb.
Aloes,	Purgative,	1 to 2 drachms.
Calomel,	Purgative,	½ to 2 drachms.
Croton oil,	Purgative,	20 to 30 drops.
Nitrate of potash,	Diuretic,	2 to 4 drachms.
Carbonate of potash,	Diuretic and sedative,	2 to 4 drachms.
Tincture digitalis,	Diuretic and narcotic,	1 to 2 drachms.
Tincture colchicum,	Diuretic and laxative,	1 to 2 drachms.
Cream of tartar,	Diuretic,	1 to 2 ounces.
Spirits of nitre,	Diuretic,	1 to 2 ounces
Resin,	Diuretic,	½ to 1 ounce.
Spirits of turpentine,	Diuretic,	½ to 1 ounce.
Emetic tartar,	Nauseant and diaphoretic,	½ to 1 drachm
Opium,	Narcotic,	1 to 2 drachms.
Laudanum,	Narcotic,	½ to 2 ounces.
Extract hyoscyamus,	Narcotic,	1 to 2 drachms.
Caraway seeds,	Carminaitive,	½ to 1 ounce.
Sulphur,	Laxative and alterative,	1 to 2 ounces.
Camphor,	Narcotic,	1 to 2 drachms.
Tinc. veratrum viride,	Sedative,	20 to 30 drops.
Belladonna,	Sedative and narcotic,	1 to 2 drachms.

Used externally, muriatic acid, nitric acid, sulphuric acid, and corrosive sublimate are caustic, iodine is alterative; and sugar of lead is sedative

CATTLE:

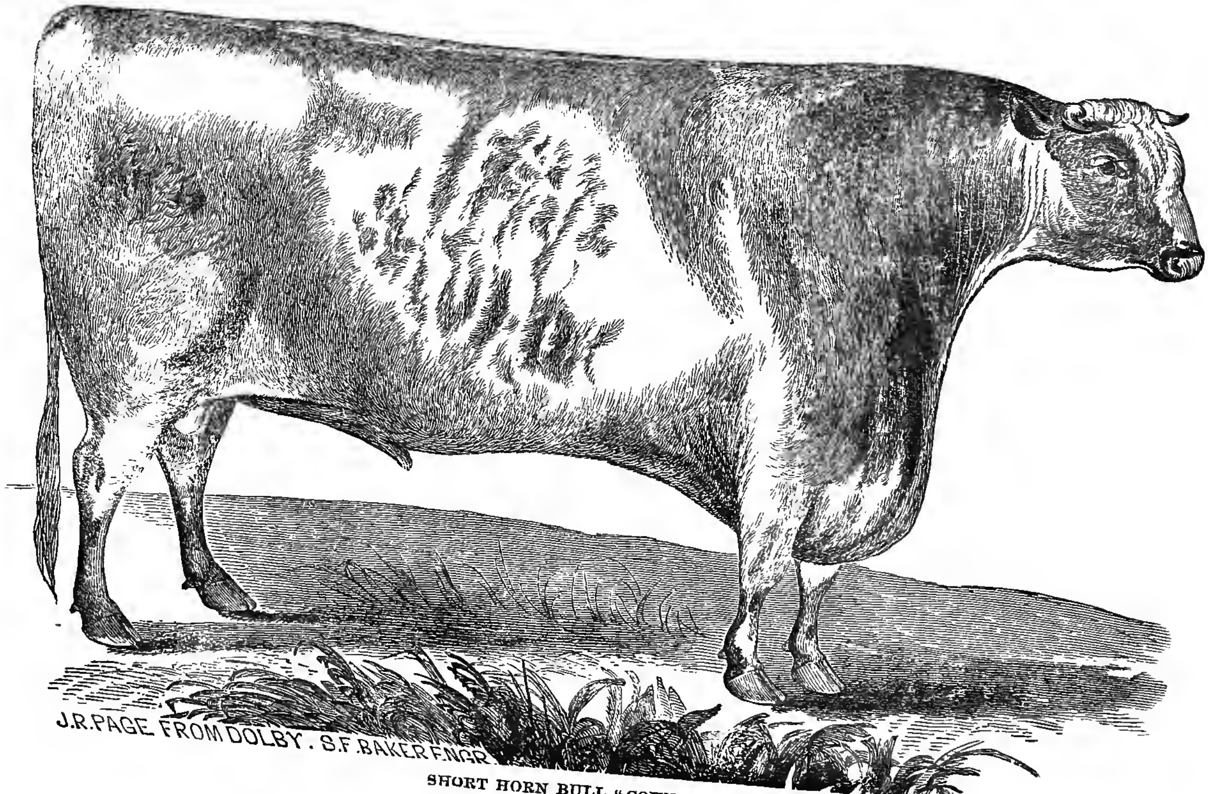
THE DAIRY AND FAT-PRODUCING BREEDS,

AND

THEIR MANAGEMENT

IN

HEALTH AND DISEASE.



SHORT HORN BULL "COUNT"

CATTLE:

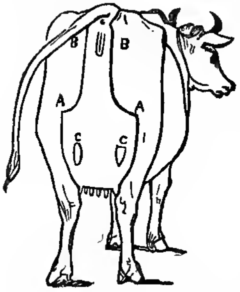
THEIR BREEDS, MANAGEMENT, ETC.

CATTLE, THEIR VALUE.—There is not a race of animals to which the community is on the whole more indebted, than to cattle. They not only cultivate the land, but afford food of various kinds, in different circumstances of their existence; and also, at death, supply very important articles of clothing and utility, and are amongst those animals to which we owe by far the most of the comforts and conveniences of life. Not to mention the use of cattle in many districts of country for the purposes of labor; they supply, during life, those most important of necessaries, milk and cream; they afford the luxuries of cheese and of butter; and at their death they are the sources of supply of the food which has become associated with national peculiarities even, and which is one of the most nutritious of the necessaries of life. Nor in death does their utility cease. Their hide provides the protection to our feet and the trappings to our horses—their horns, combs and ornaments—their hoofs even, and their waste, supply glue and gelatine; while their bones afford the handles for our knives and many useful articles in manufactures; and the refuse again, of these, returns to our soils as a most valuable manure.

THE DAIRY BREEDS OF CATTLE.—The great object for which cattle are kept by the farmer is either to grow beef for the market, or to produce milk, which shall be converted into butter or cheese, or sold as milk, to supply the great towns. Hence the former selects the fat-producing, and the latter the milk-producing class of animals. Nature, as a general thing, has provided that different races of animals, and different individuals of these races, are, more than others, adapted to the secretion of one or the other of these necessary products. The objects of the two secretions are essentially different, and the tendencies and qualities necessary for both are never active in the same animal at the same time. For while the former is a reservoir of the carbonaceous matter of the food, laid by for subsequent use in the respiratory system, the latter is the secretion of a substance necessary to support the young progeny until it is able to sustain itself, and to procure from the green pastures the food there provided for it. Hence, to produce milk is, more or less, the natural quality of all kinds and races of cattle; but some will produce large quantities, but thin and poor in quality; some smaller quantities, and rich in oily matter, while others will afford a small quantity, but abundant in solid matter; and the first class would be selected by the milk-man near the populous city, the second by the dairy-man whose product was intended to be butter, and the third by the maker of cheese. There are some tribes of cattle that are both good fatteners and good milkers, but never at the same time.

The milk-producing breeds are more widely diffused than any other, because they are capable of being kept to advantage on qualities of herbage which are inadequate profitably to sustain the fat-secreting breeds. Grass-land on the clay soils on the sides of the uplands, and even on the poorer sands, is quite adequate to supply the means of making butter or cheese; but it will very ill repay the person who attempts to feed cattle on herbage so inferior; while the rich alluvial feeding pastures which generally skirt the rivers, are far more profitably employed in raising summer beef than in the production of milk, of cheese, or of butter. Some races of long-horns, of short-horns, or of middle horns, or even of polled animals, are to be placed amongst the one class we have alluded to, and some amongst the other, and we prefer arranging the breeds most celebrated for the quantity or quality of their milk under the first head, and reserve the second to the races with special aptitude for fattening.

The question arises very naturally how far it is possible, by external conformations of the individual animal, to detect its capabilities for the secretion of milk. There are instances in every breed where it is evident nature has been more bountiful, or more niggardly, in bestowing the qualities calculated to produce the secretion for which the race may be celebrated; and there are, doubtless, marks, well known to the dairyman, which seldom fail to indicate the power of the animal in the range of qualities peculiar to his race. On the continent of Europe this has been professed to be carried to a very minute extent. François Guénon, a Frenchman, professed to have found, by close observation, a mode of deciding authoritatively, not only the quantity and quality of milk which would be given by any particular cow, but also the period for which she would retain her milk after calving, and this he proposed to do by external appearances alone, and these of a somewhat arbitrary kind.



CLASS I. FLANDRINES OF GUENON'S SYSTEM.

It is not within the compass of this work to give any thing like a description of the mode he adopted, now made public,* but the foundation of it is, his classification of all kinds of cattle into eight classes, or families; each family is divided into three sections, according to size only, and each section is again subdivided into eight orders.

The distinguishing marks by which he divides these are: 1. The Gravure, commencing at the udder, and extending to the bearing; 2. The Epis, a soft brush of hair upon the animal; and 3, Contrepoil, or hair growing the contrary way. The peculiarities of these marks constitute the distinction between the families and orders. Thus, if the gravure be large, the reservoir of milk will be large, and the product abundant; if it be formed of fine hair, if the skin be yellowish, and if a kind of bran powder which comes off the skin be of that color, they are all signs of a good

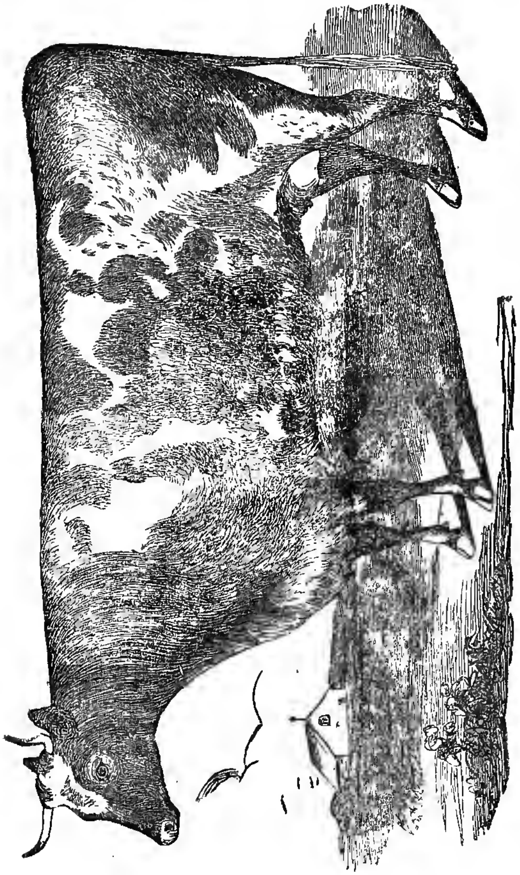
* This work, with the original figures and a full elucidation of the system, can be procured of C. M. Saxton, 25 Park Row, New York. It is an ingenious and plausible system, and well worthy the attention of dairymen.—Ed.

milker. The rationale of this is, that this gravure is but a continuation of, and corresponds with the lactiferous vessels under the belly of the animal. These "epis," he states, correspond with the reservoir of milk, and are tufts of hair growing the wrong way on the right or left of the bearing. The largest epis indicates the most rapid loss of milk. The contrepoil, or hair growing the wrong way on the gravure amidst that which grows upward, shows a default in the production of milk, even if the gravure be large. We give a fac-simile of his class 1. FLANDRINES So far is a very general description of a system which he invests with minutiæ of no ordinary kind, and it is so precise and prolix that it requires a series of some score of plates to show the variations of family, class, and order.

Without definitively pronouncing that there is no merit in his observations, it seems perfectly clear that many of his indications are of a character generally indicative of quality, but are pushed far beyond their legitimate objects; for while a wide capacity of upper udder—a fine hair—a yellow scurf, are somewhat too indefinite to classify very precisely, they are just the points which may indicate the fineness of quality, and a large lactiferous capacity which may add to the physiological signs by which a milking-cow is judged by the practical grazier.

Beauty of form is about the last qualification in a good dairy cow. Symmetry to a breeder is no criterion of milking qualities. The parallelogram is the beau ideal of a fattened ox in section, and a cylinder is that of his superficies—thus exhibiting an essence of roundness, whereas the very converse is the perfection of a milker, *i. e.* "flatness." The following are the best-settled marks or characteristics of a milking cow. Head small and fine, eye bright and full, but with a quiet and placid expression, neck thin and deep, which gives it an appearance of hollowness; shoulder and breast narrow, but projecting; ribs flat; rumps broad, and tapering down to the knee-joint, owing to the thighs being thin; tail small; udder large and round, with teats well formed, tapering to the end, and at a moderate distance from each other; thin in its skin, and with plenty of skin above; its fore-teats round and full, and with a large subcutaneous or milk vein.

The Ayrshire Cow.—In Ayrshire and the adjacent portion of the Lowlands there is an admirable breed of milch cattle, independently of those that are grazed there for the butcher, which, from whatever source they originated, owe much to the care and selection of judicious breeders. At some period or other there has evidently been a cross of the Durham or Holderness, and perhaps also of the Alderney. This breed, which became established from the middle to the close of the eighteenth century, has found its way not only into England, but also into Ireland and Wales, recommended by the excellency of the cows as milkers, although they are under the middle size. It has been estimated that a good Ayrshire cow will yield, for two or three months after calving, five gallons of milk daily; for the next three months three gallons daily, and a gallon and a half for the following three months. This milk is calculated to return about two hundred and fifty pounds of butter annually, or five hundred pounds of cheese. The foregoing estimate is, however, somewhat exaggerated; and perhaps during the best of the season four



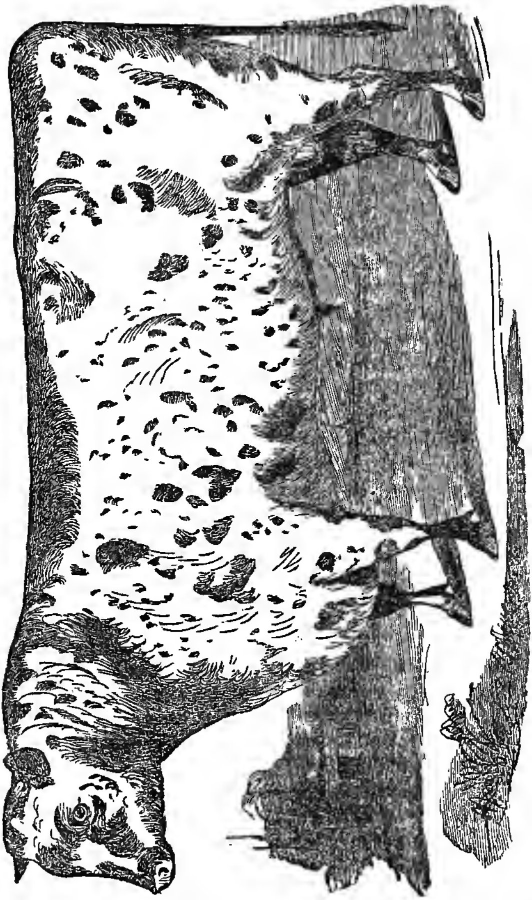
AYRSHIRE COW. FANNY.—Property of G. W. Penny, Newark, Ohio.

or four and a half gallons of milk is the average product daily of a good cow, kept in fair condition. Every thirty-two gallons of unskimmed milk will yield about twenty-four pounds of cheese, and ninety gallons twenty-four pounds of butter. We are supposing a good farm and a first-rate stock of Ayrshire cows; and considering the size of the cattle, this return from each cow is very considerable. The mode in which the cows are treated by an enterprising and successful farmer of Kirkum is thus detailed: "He keeps his cows constantly in the byre (or shed) till the grass has risen so as to afford them a full bite. Many put them out every good day through the winter and spring, but they poach the ground with their feet, and nip up the young grass as it begins to spring, which, as they have not a full meal, injures the cattle. Whenever the weather becomes dry and hot, he feeds his cows on cut grass in the byre, from six o'clock in the morning to six at night, and turns them out to pasture the other twelve hours. When rain comes, the house feeding is discontinued. Whenever the pasture grass begins to fail in harvest, the cows receive a supply of the second growth of clover, and afterward of turnips strewed over the pasture-ground. When the weather becomes stormy, in the months of October and November, the cows are kept in the byre during the night, and in a short time afterward during both night and day; they are then fed on oat-straw and turnips, and continue to yield a considerable quantity of milk for some time. Part of the turnip crop is eaten at the end of harvest and beginning of winter, to protract the milk, and part is stored up for green food during the winter. After this store is exhausted, the Swedish turnip and potatoes are used along with dry fodder, till the grass can support the cows. Chaff, oats, and potatoes are boiled for the cows after calving, and they are generally fed on rye-grass during the latter part of the spring."

The improved Ayrshire cow of the present day has the head small, but rather long, and narrow at the muzzle, though the space between the roots of the horns is considerable; the horns are small and crooked, the eye is clear and lively, the neck long and slender, and almost destitute of a dewlap; the shoulders are thin, and the fore-quarters generally light; the back is straight and broad behind, especially across the hips, which are roomy; the tail is long and thin. The carcass is deep, the udder capacious and square, the milk-vein large and prominent; the limbs are small and short, but well knit; the thighs are thin; the skin is rather thin, but loose and soft, and covered with soft hair. The general figure, though small, is well proportioned. The color is varied with mingled white and sandy red.

Whether the Ayrshires are judged by their actual produce, or by the external points which by experience and observation are acknowledged to denote dairy qualities, it must be admitted that they take a high rank. From a fair consideration of their merits, it is believed that their adoption for the dairy would secure the following advantages over the stock commonly kept for that purpose in this country:

1. A greater quantity of milk, butter and cheese for the food consumed. 2. Greater uniformity in the general character of the stock from its inherent or hereditary qualities. 3. Better symmetry and constitution, and greater tendency to gain flesh when not giving milk.



AYRSHIRE BULL, DUKE.—PROPERTY OF G. M. PENNY, NEWARK, OHIO.

At the present time there are several breeders in the State of New York who are turning their attention to the Ayrshires. The principal stocks known to the writer are those of E. P. Prentice, near Albany; L. G. Morris, Fordham, Westchester county; and J. C. Tiffany, Coxsackie. Of these Mr. Prentice's comprises the largest number, over twenty head. They have been derived from the imported cow *Ayr*, the importations of Mr. Ward, Captain Randall, Mr. Lawson, and Mr. Shurtleff, of Massachusetts, and one or two other imported animals.

The Alderneys or Jerseys.—The Jersey cow is a singularly docile and gentle animal; the male, on the contrary, is apt to become fierce after two years of age. In those bred on the heights of St. Ouen, St. Brelade, and St. Mary, there is a hardiness and sound constitution that enables them to meet even a Scotch winter without injury; those bred in the low grounds and rich pastures are of larger carcass, but are more delicate in constitution.

Of the ancient race it was stated, perhaps with truth, that it had no tendency to fatten; indeed some cows of the old breed were so ungainly, high-boned, and ragged in form—Meg Merrilies of cows—that no attempt to fatten them might succeed, the great quantities of milk and cream which they produced probably absorbing all their fattening properties.

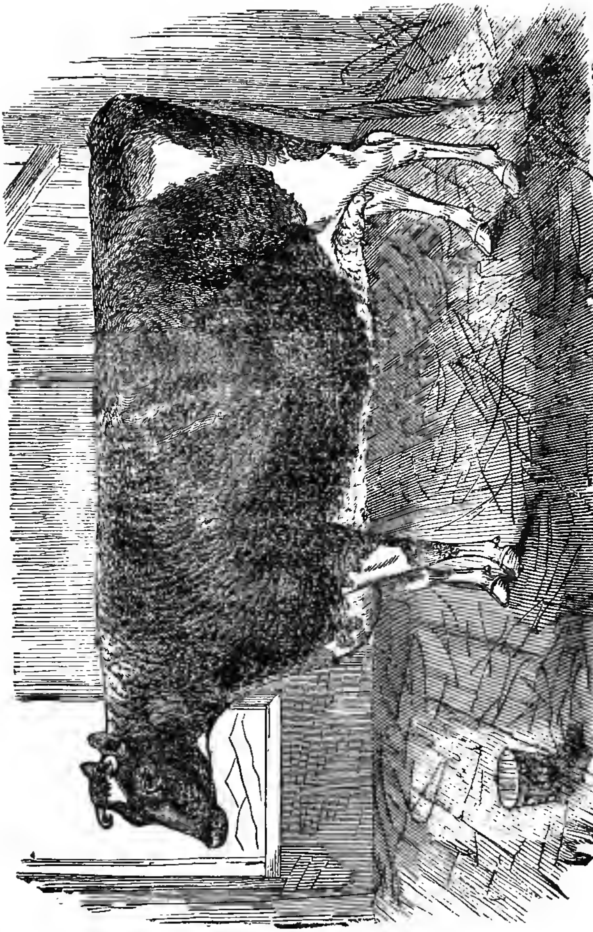
Yet careful attention to crossing has greatly remedied this defect. By having studied the habits of a good cow with a little more tendency to fatten than others, and crossing her with a fleshy, well-conditioned bull, of a race that was also known to produce quality and quantity of butter—the next generation has proved of a rounder form, with a tendency to make fat, without having lost the butyraceous nature.

Some of these improved animals have fattened so rapidly while being stall-fed, from the month of December to March, as to suffer in parturition, when both cow and calf have been lost; to prevent which it is indispensable to lower the condition of the cow, or bleed, in good time. Such animals will fatten rapidly. Their beef is excellent; the only defect being in the color of the fat, which is sometimes too yellow. It is now a fair question, whether the improved breed may not fatten as rapidly as any breed known.

It was anciently thought that the cream from the Jersey cow was too rich for making cheese. Mr. Le Feuvre, of La Houge, who has a fine breed of cows, tried the experiment two years since, and succeeded to admiration. It was made from the pure milk, cream and all, as it comes from the cow. It was found that the quantity of milk that would have produced a pound of butter, afforded one pound and a half of cheese.

From the quantity of milk which produced a cheese of twenty pounds' weight, the *drainings* of the curds and whey, on being churned, yielded four pounds of butter. This butter was of an inferior quality when eaten with bread, but was superior to any other for the making of pastry; it was peculiarly hard, and of excellent texture for such use in the hot weather. The writer has tasted cheeses from Mr. Le Feuvre's farm quite equal in quality to the richest double-Glo'ster.

On one or two farms, besides General Fouzel's, butter is made from



J.R. PAGE DEL. G.F. BAKER LITH.

ALDERNEY COW, SYLPH.—PROPERTY OF JAMES O. SHELDON, GENEVA, N. Y.

clouted cream in the Devonshire mode; but as this is not peculiar to Jersey, it is not noticed further than that ten pounds of butter are usually made in five minutes by this process. The usual way of procuring the cream is by placing the milk in pans about six inches deep, the glazed shallow earthenware having taken the place of the unglazed deep vessels.

It is admitted that the richest milk and cream are produced by cows whose ears have a yellow or orange color within. Some of the best cows give twenty-six quarts of milk in twenty-four hours, and fourteen pounds of butter from such milk in one week. Such are rare. Good cows afford twenty quarts of milk daily, and ten pounds of butter weekly, in the spring and summer months. Butter is made every second or third day.

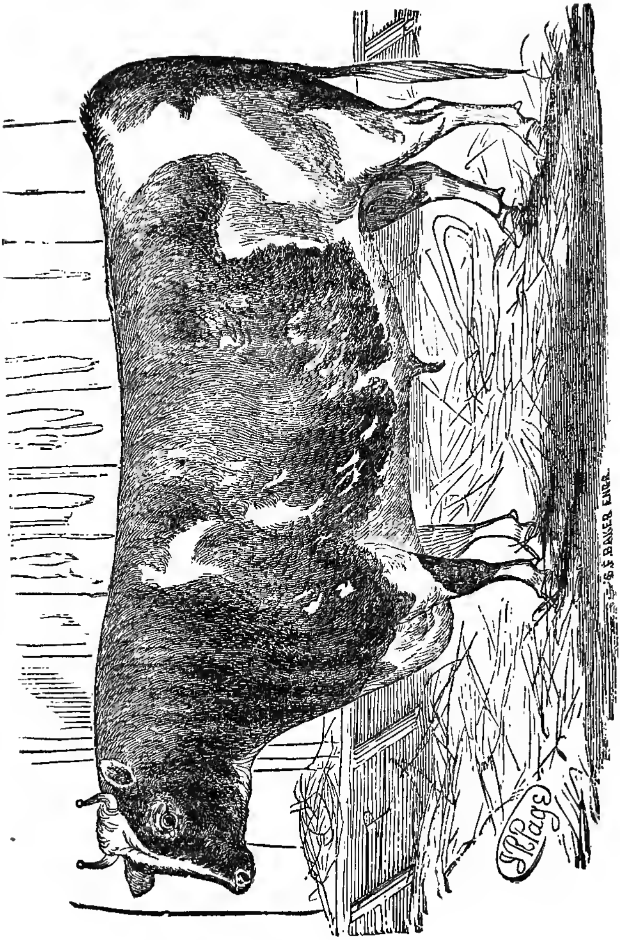
Lactometers indicate the degrees of richness of cream which the milk of any cow affords, with great nicety. This varies with different food. The mode is to fill the lactometer up to zero with the first milk that is drawn from the cow in the morning; then, when the udder is nearly emptied, to fill a second lactometer with the residue of the milk, throwing a little out of the lactometer, to refill it to zero with the very last drops which can be drawn from the cow: these will be nearly all cream. The lactometer filled with the first milking may only indicate four degrees of cream, while that filled with the last milking may indicate forty degrees of cream. Then, by dividing the sum total, forty-four by two, we have twenty-two degrees of cream, which a very good cow will produce; others so little as ten or fifteen.

Jersey butter made when the cows are partially fed on parsnips, or white carrots and grass in September and October, when salted and potted will keep till the following spring, preserving as well as Irish butter, with a much less rank flavor.

The foregoing, from Colonel J. Le Couteur, of the Island of Jersey, one of the most intelligent breeders and judges of this breed of cattle, and the accompanying illustrations of the improved animals, show that they are not now the angular, ill-shapen animals they once were; but that, like the Ayrshires, they are worthy the attention of our dairymen.

The Yorkshire Cow.—Having given instances of milk-producing cows from the middle-horn and crumpled-horn breeds, we place next one of the short-horn class; not, indeed, the high bred Durham short-horn, but a large capacious animal, possessing several of its qualities, and giving a large quantity of milk, with as much aptitude to fatten as is consistent with the production of milk, and hence is selected by the dairymen of large towns, and especially of London, for the supply of milk for a given period, and then to be fatted on distillers' refuse, and other waste matters which a town will afford, and thus give a double pay to the dairyman.

The Yorkshire cow is of much larger size than either of those we have been considering; and, when fat, will weigh from eight to eleven hundred pounds. Her head is fine, and somewhat small; there is a serene placidity of eye, which shows a mild and gentle disposition, tending alike to produce fat and milk. The horns are small and white, the muzzle without black spots; the breast deep and prominent, but that and the shoulders thin; the neck somewhat narrow, but full below the



ALDERNEY BULL, IVANHOE.—PROPERTY OF JAMES O. SHELDEN, GENEVA, N. Y shoulders, and without any loose skin; the barrel somewhat round; the belly capacious; milk-vein large; back perfectly straight; rump wide, and flat as a table; tail small, and set on so that there is almost a straight line from the tail to the head. The prevailing color is roan, or red or white; and sometimes white, with the tips of the ears red. The thighs are thin; but the legs are straight and somewhat short. The udder is very large and muscular, projecting forward, well filled up behind, and so broad as to give the cow the appearance of a waddle in her walking. Indeed, her qualities are not inappropriately described in some doggerel lines often quoted; and two of the verses we shall venture to give, as most aptly descriptive of the Yorkshire cow·

"She's broad in her ribs, and long in her rump,
A straight and flat back without ever a hump;
She's wide in her hips, and calm in her eyes;
She's fine in her shoulders, and thin in her thighs.

"She's light in her neck, and small in her tail,
She's wide in her breast, and good at the pail;
She's fine in her bone, and silky of skin;
She's a grazier's without, and a butcher's within."

The quantity of milk given by these cows by far exceeds that of any others, though less perhaps than that of some others in proportion to her size. The writer has had instances where as much as thirty quarts per day, in summer, have been given. The distended udder has so swollen before calving, that she was obliged to be milked several days before she calved; and, after calving, had to be milked three times a day, for fear of the consequences of an over-distended udder. She, moreover, gave a large quantity of butter as well as milk, and soon after calving she has given fifteen pounds per week.

All these things being considered, and taking into account the carcass value of the cow after she has yielded her milk, it is not too much to say that there is no breed of cows so highly gifted with milk-secreting qualities who are also otherwise so profitable as the Yorkshire.

The Leicestershire Breed.—The old breed of England has had a more successful struggle for existence than the native breed of Gloucestershire. It was here that Bakewell exerted his talents to improve the long-horned breed of cattle, and, though he succeeded in removing the coarseness from these animals, and increased their tendency to fatten, it appears he did not attain the object of either establishing or improving their dairying qualities; and hence his breed is but little prized by the Leicestershire dairymen, who prefer the coarser and larger animals, which give large quantities of good milk, to those which have less milk-giving capabilities, but are more suitable for the grazier.

The yield of cheese, rather than that of milk, is the object of the dairymen of Leicestershire. A good cow will give some four hundred pounds of cheese, and produce as many gallons of milk in the year, allowing for the seven weeks when she is supposed to be dry. In some districts the cows are kept for six, or seven, and even more years, especially when they are good cheese producers; for it is of more consequence to the farmer to have a cow which, for six years, gives him an annual supply of the stock-in-trade of his farm—his cheese—than to get a few pounds more or less when she is sold. Indeed a smaller difference really takes place than may be at first imagined. The rich Leicestershire grass enables the farmer, on a large scale at least, to sell off his cattle fat, which would have been disposed of for the dairy. Hence as old cows of any kind are not expected to be very valuable grazers, he does not expect her to do wonders; and if he succeeds in getting her moderately fat, he is satisfied to take a smaller price per stone for her beef than is received for a primer animal.

The Cheshire Breed is, like that of Gloucestershire, or even more so, becoming rapidly extinct. The old breed of the county was, like that of most dairy districts, a long-horned variety; but the vicinity of the large-town dairy system, introduced into the country by the springing up of large towns, has brought here, as elsewhere, the short-horn cow of Yorkshire into competition with the native breed; the extra quantity of milk they produce has been regarded somewhat more than its quality, and, in consequence, the character of the Cheshire cheese has somewhat deteriorated in the markets.

The Dorsetshire Breed.—In this, as in most dairy districts, the milk is rather an object than either form or fat, and hence a somewhat coarse, ill-shapen class of cattle prevails. The cattle are of a long-horn breed, large, and coarse, principally of a red color, with flat chests and buttocks. Attempts have been made to cross this also with the Devon, Hereford, and Ayrshire breeds, but this does not appear to have succeeded; and the only advance the dairymen have been enabled to make in this county has been to introduce one Alderney cow to a dairy for every ten or twelve of the native breed; this is found to have a very beneficial tendency, to increase the quantity of cream, and to improve much the quality of the butter.

The Kerry Breed.—Crossing the Irish Channel, there is a hardy small-sized cow celebrated as a cottier's dairy-cow—the neat pet-like cow of Kerry. Her placid countenance, patient, meek deportment, fine head and legs, her small tail, fine shoulders, breast, and quarters, and her skinny udder and large milk-vein, bespeak the characteristics of the milker, and well they may, for she is a treasure to the cottage farmer! —so hardy, that she will live where other cattle will starve; she will yield milk at the expense of her own muscles, nay, will yield it abundantly when they seem all but gone; and will give it also of quality so rich, that she is a perfect machine for converting the hardest and coarsest cattle-food into rich and nutritious milk and butter.

FAT-PRODUCING BREEDS OF CATTLE.—Whatever theoretical objections may be raised against overfed cattle, and great as may be the attempts to disparage the "mountains of fat," as highly-fed cattle are sometimes designated, there is no doubt of the practical fact, that the best butcher cannot sell any thing but the best-fatted beef; and of whatever age, size, or shape, a half-fatted ox may be, he is never selected by judges as fit for human food. Hence a well-fatted animal always commands a better price per pound than one imperfectly fed, and the parts selected as the primest beef are just the parts where there are the largest deposits of fat. The rump, the crop, and the sirloin, the very favorite cuts, which always command from twenty to twenty-five per cent. more than any other part of the ox, are just those parts on which the largest quantities of fat are found; so that instead of the taste and fashion of the age being against the excessive fattening of animals, it is, practically, exactly the reverse. Where there is most fat there is the best lean; where there is the greatest amount of muscle without its share of fat, that part is accounted inferior, and used for a different purpose; in fact, so far from fat being a disease, it is a condition of muscle, necessary to its utility as food—a source of luxury to the rich, and of comfort to the poor, furnishing a nourishing and healthy diet for their families.

Fattening is a secretive power which grazing animals possess, enabling them to lay by a store of the superfluous food they take for seasons of cold or scarcity. It collects round the angular bones of the animal, and gives the appearance of rotundity; hence the tendency to deposit fat is indicated, as we have stated, by a roundness of form, as opposed to the flatness of a milk-secreting animal. But its greatest use is, that it is a store of heat-producing aliment, laid up for seasons of scarcity and want. The food of animals for the most part may be said to consist of a saccharine, an oleaginous, and an albuminous principle. To the first belong all the starchy, saccharine, and gummy parts of the plants, which undergo changes in the digestive organs similar to fermentation before they can be assimilated in the system; by them also animal heat is sustained. In indolent animals the only parts of plants are deposited and laid up as fat; and, when vigor and strength fail, it is taken up, and also used in breathing to supply the place of the consumed saccharine matter. The albuminous, or gelatinous principle of plants, is mainly useful in forming muscle, while the ashes of plants, the unconsumable parts, are for the supply, mainly, of bone, hair, and horn, but also of muscle and of blood, and to supply the waste, which continually goes on. Now, there are several qualities which are essentially characteristic of a disposition to fatten. There have not, as yet, been any book-rules laid down, as in the case of Mr. Guénon's indications of milking cows; but there are marks so definite and well understood, that they are comprehended and acted upon by every grazier, although they are by no means easy to describe. It is by skillful acumen that the grazier acquires his knowledge, and not by theoretical rules; observation, judgment, and experience, powerful perceptive faculties and a keen and minute discrimination and comparison, are essential to his success.

The first indication he relies on is the touch. It is the absolute criterion of quality, which is supposed to be the keystone of perfection in all animals, whether for the pail or the butcher. The skin is so intimately connected with the internal organs, in all animals, that it is questionable whether even the schools of medicine might not make more use of it, in a diagnosis of disease. Of physiological tendencies in cattle, however, it is of the last and most vital importance. It must neither be thick, nor hard, nor adhere firmly to the muscles. If it is so, the animal is a hard grazer, a difficult and obstinate feeder—no skillful man will purchase her—she must go to a novice, and even to him at a price so low as to tempt him to be a purchaser. On the other hand, the skin must not be thin, like paper, nor flaccid, nor loose in the hand, nor flabby. This is the opposite extreme, and is indicative of delicateness, bad, flabby flesh, and possibly of inaptitude to retain the fat. It must be elastic and velvety, soft and pliable, presenting to the touch a gentle resistance, but so delicate as to give pleasure to the sensitive hand—a skin, in short, which seems at first to give an indentation from the pressure of the fingers, but which again rises to its place by a gentle elasticity. The hair is of nearly as much importance as the skin. A hard skin will have straight and stiff hair; it will not have a curl, but be thinly and lankly distributed equally over the surface. A proper grazing animal will have a mossy coat, not absolutely curled, but having a disposition to a graceful curl, a semifold, which presents a waving inequality, but as different from a close and straightly-laid coat, as it is from one standing off the animal at right angles, a strong symptom of disease. It will also, in a thriving animal, be licked here and there with its tongue, a proof that the skin is duly performing its functions. There must be also the full and goggle eye, bright and pressed outward by the fatty bed below, because, as this is a part where nature always provides fat, an animal capable of developing it to any considerable extent will have its indications here, at least when it exists in excess.

So much for feeding qualities in the animal, and their conformations indicative of this kindly disposition. Next come such formations of the animal itself as are favorable to the growth of fat, other things being equal. There must be size where large weights are expected. Christmas-beef, for instance, is expected to be large as well as fat. The symbol of festivity should be capacious as well as prime in quality. But it is so much a matter of choice and circumstance with the grazier that profit alone will be his guide. The axiom will be, however, as a general rule, that the better the grazing soil the larger the animal may be; the poorer the soil the smaller the animal. Small animals are unquestionably much more easily fed, and they are well known by experienced men to be those best adapted to second-rate feeding pastures. But beyond this there must be breadth of carcass. This is indicative of fattening perhaps beyond all other qualifications. If rumps are favorite joints, and produce the best price, it is best to have the animal which will grow the longest, the broadest, and the best rump; the same of crop, and the same of sirloin; and not only so, but breadth is essential to the consumption of that quantity of food which is necessary to the development of a large amount of fat in the animal. Thus a deep wide chest, favorable for the respiratory and circulating functions, enables it to consume a large amount of food, to burn up the sugary matter, and to deposit the fatty matter—as then useless for respiration, but hereafter to be prized. A full level crop will be of the same physiological utility, while a broad and open framework at the hips will afford scope for the action of the liver and kidneys.

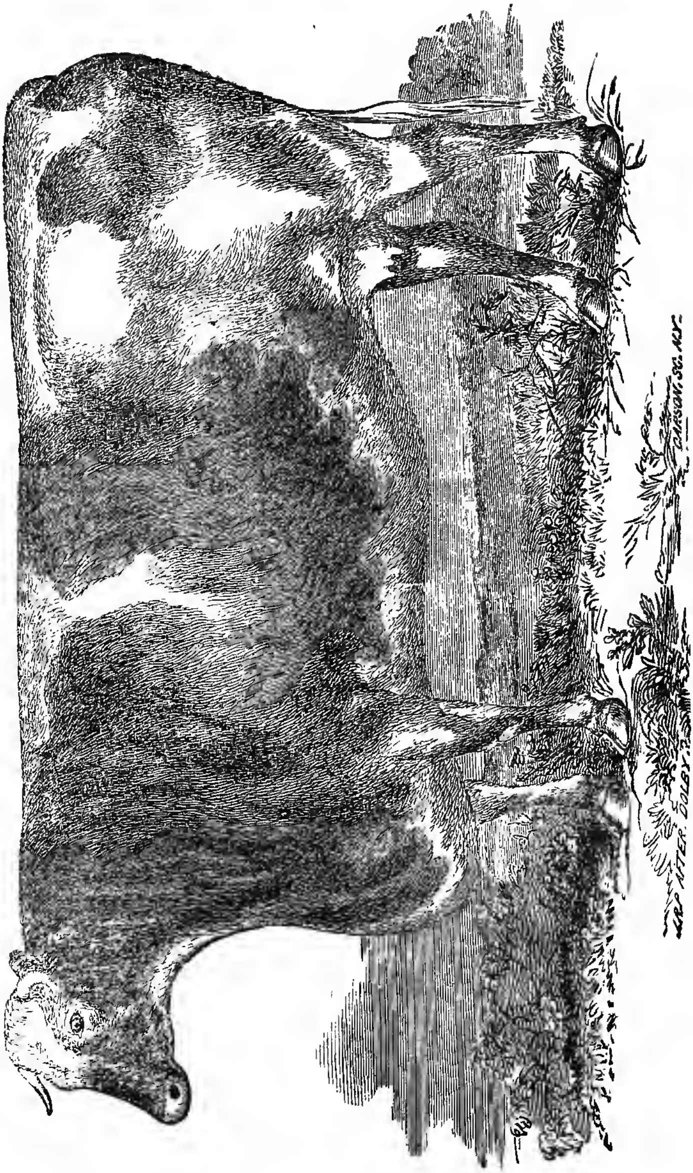
There are other points also of much importance; the head must be small and fine; its special use is indicative of the quick fattening of the animal so constructed, and also it is indicative of the bones being small and the legs short. For constitutional powers, the beast should have his ribs extended well toward the thigh-bones or hips, so as to leave as little unprotected space as possible. There must be no angular or abrupt points; all must be round, and broad, and parallel. Any depression in the lean animal, will give a deficient deposit of flesh and fat at that point, when sold to the butcher, and thus deteriorate its value; and hence the animal must be round and full. But either fancy, or accident, or skill—we will not pretend to say which—has associated symmetry with quality and conformation, as a point of great importance in animals calculated for fattening; and there is no doubt that, to a certain extent, this is so. The beast must be a system of mathematical lines. To the advocate of symmetry the setting on of a tail will be a condemning fault; indeed, the ridge of the back, like a straight line, with the outline of the belly exactly parallel, viewed from the side, and a depth and squareness when viewed from behind, which remind us of a geometrical cube rather than a vital economy, may be said to be the indications of excellence in a fat ox. These qualities are inherent in some breeds; there may be cases and instances in all the superior breeds, and in most there may be failures.

By far the first in the list for feeding excellence are—

The Short-Horn or Durham Breed.—The origin of the breed is involved in great obscurity. They are supposed by some to be traced into Holderness; and to have been imported from Holstein, according to others; from continental Europe they certainly seem to have come; and, being successively improved by a variety of breeders, they have ended in that distinct race of animals, extraordinary beyond all others for their astonishing propensities to feed. Others, again, refer their origin to a native race of cattle called the Teeswater, because they have from time immemorial inhabited the valley which the Tees has formed by its washings down of the mountain limestone rocks, in which it has its origin; these, it is said, being crossed by the Holderness importations, gradually became a new race.

The late Mr. Bates traces back the short-horns to a breed in the possession of the Aslabies of Studley, and the Rev. H. Berry to an improvement in the East Riding of Yorkshire, by the importation of a breed from Holland by Sir W. St. Quintin of Scampston. Of these early ages of the short-horns, however, it is hardly necessary to say more than this—that a breed from time immemorial inhabited the valley of the Tees, and, trained and bred to feed, for a vast succession of generations, on its fertile deposits, acquired the habits of speedy fat-forming; for in these valleys, where hay alone will feed the largest ox, the production of fat would be so far an object that breeders would always select the best and easiest feeding animals; and thus the character of the district, through a number of centuries, might easily lay the groundwork of that improvement which the Milbanks, the Greys, the Booths, the Coates, and, above all, the Collings, have effected.

We will give the latest description of the qualities of the modern short-horn from the most recent authority, Mr. Dickson. After referring to the general symmetry of the frame and its delicate color, either deep-red cream-colored, white, or delicate roan—the latter the most fashion-



SHORT-HORN COW

able and indeed prevailing color—he speaks of it as possessing "the mellowest touch, supported on small clean limbs, showing, like those of the greyhound and the race-horse, the union of strength with fineness, and ornamented with a small, lengthy, tapering head, neatly set on a broad, firm, deep neck; furnished with a small muzzle, wide nostrils, prominent mildly-beaming eyes; thin, large, veiny ears, set near the crown of the head, and protected in front with semicircularly-bent white or waxy-colored short, smooth, pointed horns; all these several parts combine to form a symmetrical harmony which has never been surpassed in beauty and sweetness by any other species of the domesticated ox."

Keeping in mind what was said to be the perfection of a fat animal, the same authority, speaking of the short-horn, says: "We have a straight level back from behind the horns to the top of the tail, full buttocks, and a projecting brisket; we have, in short, the rectangular form; we have also the level line across the hook-bones (hip), and the level top of the shoulder across the ox, and perpendicular lines down the hind and fore legs on both sides; these constituting the square form when the ox is viewed before and behind; and we have straight parallel lines from the sides of the shoulders along the utmost parts of the ribs and the sides of the hind quarters; and we have these lines connected at their ends by others of shorter and equal length across the end of the rump and the top of the shoulder; thus constituting the rectangular form of the ox when viewed from above down the back."

It will be very wide from our purpose to show either the immense amount of fat which has at one time or another accumulated on the backs of these wonderful animals, or the speed with which this has been done. Neither would it tend much to elucidate the principles of breeding or grazing to detail at any length the prices which short-horns have commanded and do command.

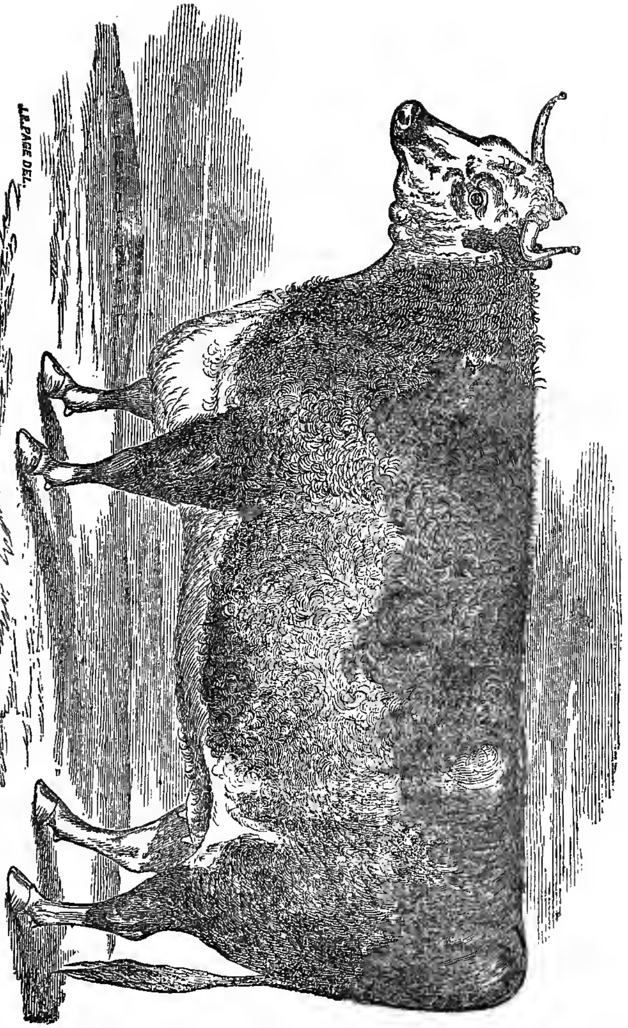
Nor is it in their rapid fattening alone that this race of cattle excels. They are, beyond all question, the most remarkable for early maturity. Fat deposits are generally the result of a mature state of the animal. There are few animals who will lay it on, to any degree, at least, until they are fully formed. The short-horn is an exception. They commence the fat-forming process as calves. This seems to increase with their growth, and at a year old they have all the semblance of cows.

The feeders of short-horns, instead of keeping them to three, four, or five years of age, fatten them and sell them off at from two to two and a half years; they can thus turn off one-half more at least, if not a greater proportion, of beef, from their farms or their stalls, than could possibly be done with any other breed. Hence they have quick returns and large amounts of beef for the food-consumer. We will not deny that the short-horn requires good keep, and shelter, and care. She needs nourishing diet; but she pays for all, for she is a cow when another is a calf—the ox is fat when the other is growing. Hence the short-horn stands the very first on the list of the fat-producing breeds of cattle.

The Hereford Breed.—This is a middle-horn breed of cattle, upon which a good deal of pains has lately been taken. The success of short-horn breeders,—of the Booths, the Bates, the Wileys, the Hoppers, and a score more of short-horn patrons, have caused a healthy emulation, and the difference between the Hereford cattle now exhibited, and those shown some ten or twelve years ago, shows not only that these breeders have judgment and skill, but it must also be confessed, that the breed have fattening capabilities. The old Hereford was a deep-brown animal, sometimes with an ochery cast, free from white, like the Devons; but an improved breed now possess the county, in which the invariable fashion is a dark red, with a white face, white belly, and not unfrequently a white back. The skin is thicker and less mellow than that of the short-horn, nor has the hair the mossy softness or graceful curl of the latter. The eye is full and lively, the chest deep and broad, the loin also broad, and the hips well-expanded; a level broad rump, a round barrel, and full crop, full, deep flank, well-ribbed home; small bones, clean and perpendicular thighs, belly almost parallel with back, head small. Indeed, color and symmetry are perhaps the predominant qualifications which secure the high favor of the breeder.

From the above description it will be seen that the Hereford, possessing many essentials in form, is destitute of the quality producing early maturity and speedy disposition to fatten. He lays on his flesh, soft and mottled, on the best parts; he has full sirloins, rumps, and crop, but he shows his beef on the outside; and he requires much more time to develop his qualities than the short-horn. In milking qualities the cow is even behind the ox in feeding, and it must in general be three and a half to four years old before it can be fatted with any very marked success. They require a rich pasture, though a hardy animal, and the average weight when fat does not exceed eight to ten hundred pounds. Herefordshire being more a breeding than a feeding county, the cattle are reared there, and sold off at three years old to graze in the counties of Leicester, Northampton, and the rich grass districts; but, with all its good qualities, it must be admitted that it requires from ten to twelve months more to feed than its more favored compeer, the short-horn. We give a sketch of first-rate specimens. Much controversy has gone on lately as to the merits of the two breeds—the short-horn and the Hereford; but it must be conceded, that while the short-horn is penetrating into the heart of Scotland, into the south of England, and into the county of Gloucester, on the one hand, and into Norfolk on the other, the Hereford is hardly keeping his ground, he is making no inroads into any one important new grazing district; and unless the gigantic efforts now made to amend the characteristics of the breed effect something more, they will dwindle still further away.

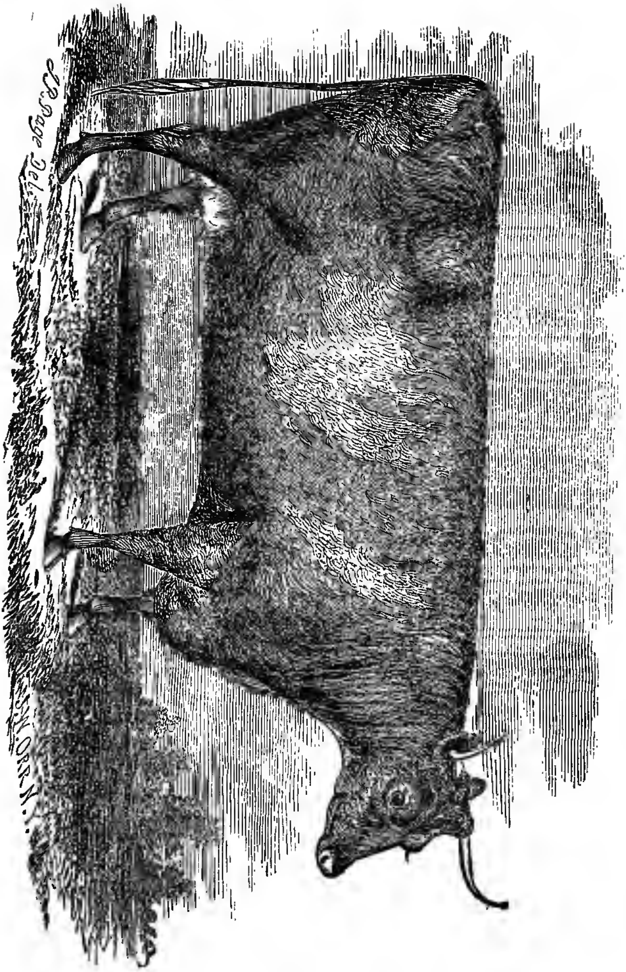
The West Highland Scot.—Next to the Hereford in the ranks of fattening animals, we place this breed of cattle; and they well deserve it,—for they will fatten in places and on food on which both the short-horn and the Hereford, too, would perish. This West Highland breed is somewhat wild in its nature, and will not bear the least confinement, tying, or control. It is eminently gregarious, and if kept alone will generally fret and pine. The peculiarity of the breed is, that it is a small animal, generally deep jet-black, pale red, or dun, seldom any white spots on any part of the body; its horns are long, and turned



HEREFORD COW, GRACE.—PROPERTY OF ERASTUS CORNING, JR., ALBANY, N. Y upward and outward. The coat is peculiar, soft, long, and absolutely curled, so as to form a sort of fleece. Another peculiarity is, that they form their beef almost entirely on the back, which is therefore straight; the body is round; and they lay on fat rapidly under circumstances in which another animal would literally starve.

He can assimilate, from a soil so barren as to be sterile for others, as much food as will enable him to feed—for to grow is out of the question, that process is performed on his native hills; if indulged, however, he will pay for it in the rapidity of his fattening, and the excellence of his beef. They will weigh, with amazingly little care, from seven hundred to one thousand pounds. The exceptions to this rule, however, are very important in special cases. The Duke of Northumberland having a very promising Argylshire "stot"—bullocks, as they are called more generally in England—kept him as long as he saw him improve, to see what he would weigh. He was five and a half years old, and weighed exclusive of offal, one thousand four hundred and four pounds. Though, perhaps, one of the heaviest of the breed ever slaughtered, he was neither the fattest nor the most inactive, but seemed in that state to possess all the activity which he had on his native hills. To give an idea of his keeping, and of the hardihood of his race, it is only necessary to give an account of his food. In the first winter he was turned out to a poor pasture, with a little bad hay; in the summer he had again a poor land pasture; in the next winter he had again a poor pasture, but a few turnips; in the following summer he had a fair pasture, and the same pasture in winter, with a more liberal allowance of turnips; in the third summer he was tolerably well grazed; in the fourth winter, he had as many turnips as he could eat in the sheltered straw fold, and in the summer in which he was fatted, he had all the indulgence of a feeding animal, viz., cut clover, hay, mangel-wurzel, turnips, bean-meal, and a little oil-cake; the latter of which he always disliked. Mr. Quarl says his "fat was distributed in an uncommonly equable manner, of a color resembling the finest grass butter, and as firm as wax; the muscle was in ample proportion, bright in color, of fine texture, and beautifully marbled by admixture of his excellent fat."

The Devon Breed.—If this had been a treatise on drawing cattle, we should have placed this middle-horned description of animals first in our list, instead of almost last. They are physiologically well formed animals; they are a very old and carefully-kept distinct breed of animals. They are docile and tractable, patient and gentle; hardy, notwithstanding their warm and humid climate; but they are not first-rate milkers, although very good feeders. They will grow to a considerable size; and they produce a class of beef at all periods of their growth of capital quality. The red color—all red, and nothing but red—is a *sine qua non* in a Devonshire ox; he has a moderately straight top, a fine serene countenance, and small head; a somewhat thin skin, covered with curly hair. The rump is narrower than in the short-horns and the chine lighter and flatter; but the brisket is large and full, the legs fine, the shoulder slanting, the neck long and thin. He is a beast of draught, and for this he is unequaled.



DEVON COW. FAIRY.—The property of Linsley Brothers, West Meriden, Conn.

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Mr. Parkinson, in his invaluable Treatise on Live Stock, gives the weight of some specimens of six years' old cattle, which weighed some eight hundred pounds, but the cows much less. He says of them: "On the whole, they must be allowed to be good cattle for their soils, and particularly where oxen are worked at the plow. When slaughtered, they are a sort of beef that suits the consumption of many customers."

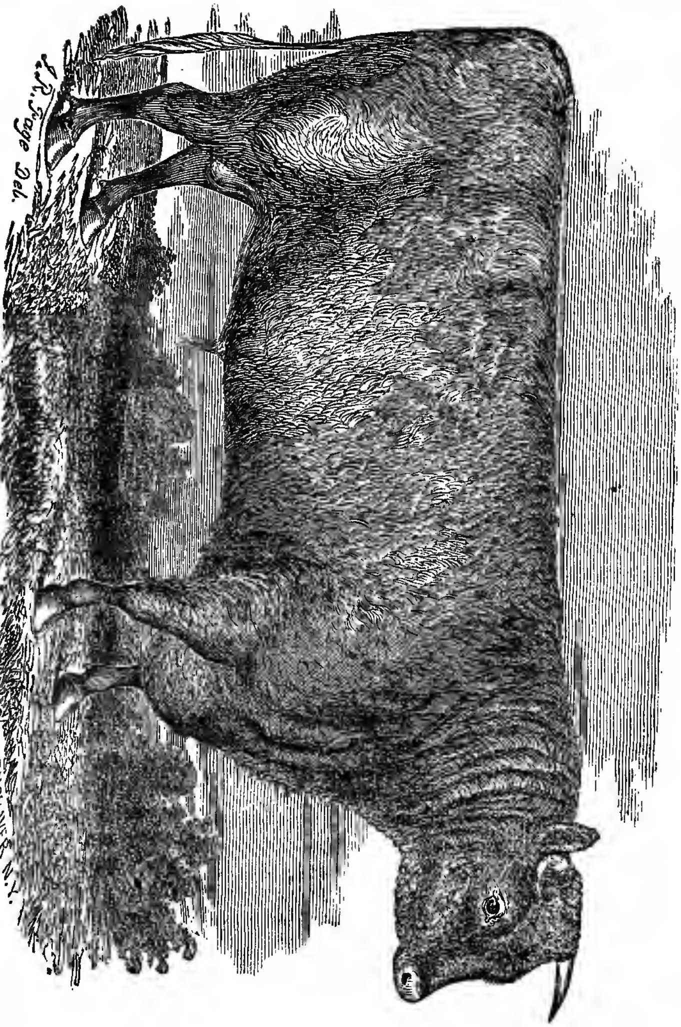
Among the most successful breeders of Devonshire cattle may be mentioned Mr. Turner, of Barton, near Exeter, Mr. Quartly of Motland, (who is the most distinguished winner,) Mr. Merson of Brinsworthy, and Mr. Davy of Moulton.

Galloway Breed.—The Galloways are prominent fat-producing animals of Scotland, and are bred in great numbers in Galloway and Dumfries-shire. They are hornless, mostly black, are small in size, compact, short-legged, hardy, have thick mossy coats, and are good feeders. As milkers they are very indifferent, although, like all small milkers, the quality is rich. They are mostly driven south and fed off on the good pastures in England, and like the Highlanders, bring the highest price in the London markets. The joints are of a good size for family roasts, and the meat is of the best description; thus making it the most desirable.

The Angus Breed.—We shall close our remarks on the fat-producing class of oxen by shortly describing a hornless or polled race of animals—the Angus "Doddies," as they are called. Being bad milkers, they are generally used for grazing, and very much fatted in their native country; they are also preferred for feeding by the graziers of Leicestershire and Norfolk. Their color is generally black, but occasionally red; the head fine; the breast deep; the back not quite straight, being a little depressed at the loin and somewhat narrow; the eye full and clear; the touch generally good, and the hair thick and curly. The tendency of the flesh, as in all the hardy Scottish cattle, is to form on the back; but they will weigh from a thousand to fourteen hundred pounds.

Qualities are so co-existent with conformation that, as a general rule, it may be received as an axiom. And as dairy and butcher qualities are generally combined only to a very limited extent, and as both qualities are rarely high in the same breed, it becomes the agriculturist to make his selection according to the object he has in view.

THE PRINCIPLES OF CATTLE-BREEDING.—We may offer a few remarks on the principles by which the breeder ought to be guided in the successful management or improvement of his stock, in whatever points he wishes it to excel, whether in those required by the grazier or the dairy-farmer. Every man, whether grazier or dairy-farmer, is desirous of turning his cattle to the most advantage; nor can this be done, unless the size of the farm, soil, climate, the produce, and the nature and extent of the pasturage, be well considered; for the cattle that the farm is best adapted for maintaining will be the most profitable. It is, however, essential, whatever the cattle be, whether for the purpose of the dairy, or for the immediate supply of the markets with their flesh,



DEVON BULL, COMET.—The property of Linsley Brothers, West Meriden, Conn.

that they be well bred, and excellent of their kind. To the dairy farmer, the most important points are, the quantity of milk yielded, its quality, its value for the production of butter, or of cheese, a freedom in the cows from vicious habits and ill temper, their character as good and healthy breeders, the ease with which, when useless as milkers, they become fattened for the market, and the nature and quantity of food requisite for this purpose. To the grazier, the quickness of becoming fat, and at as little expense as possible, the fineness of the grain of the meat, or of the muscular fibers, the mode of laying on the fat, the smallness of bone, soundness of constitution, and congeniality with the soil and the climate, are the chief points which he takes into consideration. If he is wise, he will never stint keep, nor transfer his stock from a good to an indifferent soil; and this is true also with respect to the dairy-farmer.

Contour, or beauty of form, is desirable; indeed, it is more or less connected with what may be termed utility of form, that is, a preponderance of those parts in the beast which are most delicate for the table, and bear the highest price, over the parts of inferior quality, or offal. This is connected with smallness of bone, but not a preternatural smallness, and with a tendency to depositions of fat, which, however, should not be carried to an extreme, otherwise the quantity of flesh is disproportionate, and its fiber is dry and insipid; nor is the weight of the beast proportionate to its admeasurement. Previously to the time of Mr. Bakewell,* the cattle in general were large, long-bodied, big-boned, flat-sided, slow to fatten, great consumers of food, and often black, or foul-fleshed, or, as it is called in Yorkshire, "lyery." This truly patriotic breeder, acting upon true principles, energetically set to work upon the improvement of cattle, and in defiance of opposition and a thousand difficulties, lived to see the success of his long-continued efforts. Experience and a close and acute observation had taught him that "like produces like;" in other words, that the qualities of the parents, such as beauty, or utility of form, disposition to fatness, goodness of flesh, abundance of milk, and even temper, were inherited by their offspring; and that by careful selections on the side both of the sire and dam, a breed might be ultimately established to which the title *blood* could be distinctly applied. This, of course supposes a primary selection, then a selection of such of the offspring as exhibited the properties which constituted their perfection, in the highest degree; and again of the offspring of these, and so on progressively.† At first Mr. Bakewell was necessitated to breed in and in, but as his stock increased, he was enabled to interpose more or less remote removes between the members of the same family; and ultimately he established the Dishley, or New Leicester long-horns, a breed remarkable for smallness of bone, roundness of form, aptitude to fatten upon a moderate allowance, and fineness of flesh.

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* Born at Dishley, in Leicestershire, 1725. His father and grandfather resided on the estate before him.

† Mr. Bates' rule was, "Breed in and in from a bad stock, and you commit ruin and devastation; *but if a good stock be selected, you may breed in and in as much as you please;*" and he followed this practice for fifty years, and yet had one of the finest herds ever known.

But while he accomplished this, rendering the animals admirably suited for the grazier, it was found that their qualities as milkers were much deteriorated; the dairy-farmers consequently retained their old breed, noted for the richness, though perhaps not the great abundance of the milk. We are not here speaking about the differences or the distinguished excellences of the various breeds of cattle, but of the principles upon which excellences, it matters not of what sort, may be obtained. "Like produces like," and both parents must present the same excellencies, the same characteristics. It was by following out these rules that Mr. Bakewell arrived at perfection in his breed; indeed by some he is thought to have pushed his principles too far, and the following remarks have perhaps some justice in them :—"It was his grand maxim, that the bones of an animal intended for food could not be too small; and that the fat, being the most valuable part of the carcass, could not, consequently be too abundant. In pursuance of this leading theory, by inducing a preternatural smallness of bone and rotundity of carcass, he sought to cover the bones of all his animals externally with masses of fat. Thus the entirely new Leicester breed, from their excessive tendency to fatten, produce too small a quantity of eatable meat, and that, too, necessarily of inferior flavor and quality. They are, in general, found defective in weight, proportionally to their bulk; and if not thoroughly fattened, their flesh is crude and without flavor; while, if they be so, their carcasses produce little else but fat, a very considerable part of which must be sold at an inferior price, to make candles instead of food; not to forget the very great waste that must ever attend the consumption of over-fattened meat.

"This great and sagacious improver (Mr. Bakewell), very justly disgusted at the sight of those huge, gaunt, leggy, and misshapen animals with which his vicinity abounded, and which scarcely any length of time, or quantity of food, would thoroughly fatten, patriotically determined upon raising a more sightly and profitable breed; yet, rather unfortunately, his zeal impelled him to the opposite extreme. Having painfully, and at much cost, raised a variety of cattle, the chief merit of which is to make fat, he has apparently laid his disciples and successors under the necessity of substituting another that will make lean."—*Illustrations of Natural History*, p. 5.

Granting the truth of these strictures, which we scarcely can to the full extent, what is the inference as it respects the system of breeding? Namely, this: that by pursuing the proper mode, by proper selections, and by joining like excellencies and properties in the sire and dam, and not by rashly crossing distinct breeds, but by making one breed the great foundation, and working upon it, remembering that "like produces like," not only will the point aimed at be attained, but it may even be overshot, thus demonstrating the power which the judicious breeder possesses.

Since Mr. Bakewell's time the New Leicester breed has become degenerated; by some the stock has been bred in and in too closely, and by others very injudiciously crossed. In the mean time the short-horned breeds of cattle have been gaining an ascendancy, so that few really excellent long-horns are now to be seen. This, however, has nothing to do with the great principles we have endeavored to illustrate; they apply alike to all breeds of cattle. Every breeder, then, should well consider the properties of the stock from which he breeds, investigate their good qualities and their bad qualities, and while he endeavors to keep up or improve the former, he should study to remove the latter. His selection must be strict; the heifer or cow should have as few of the bad points as possible, every excellence in perfection, and be in good health; the bull should be of the same kind, and if related, only in a remote degree; nor should he have been brought up on a pasturage differing from that of the cow, or under the influences of a different local climate; he should not only possess the good points *desired*, in all their perfection, but he should also have the points which the farmer considers to be the excellences of his own stock, as admirably developed. Thus acting with judgment he may expect improvement; and if he fail, there is some concealed fault which has been overlooked, either on the one side or the other, or some defect in their parents, and which (in accordance with the tendency there is in families to exhibit, from time to time, certain peculiarities, latent perhaps for a generation) has again made itself manifest; consequently, on both sides there ought to be what is termed "good *blood*." But this is to suppose a stock already improved to a great extent; and here we may repeat the injunctions laid down by the Rev. H. Berry, which more particularly apply to the farmer commencing *de novo:* "A person selecting a stock from which to breed, notwithstanding he has set up for himself a standard of perfection, will obtain them with qualifications of different descriptions, and in different degrees. In breeding from such he will exercise his judgment, and decide what are indispensable or desirable qualities, and will cross with animals with a view to establish them. His proceeding will be of the '*give and take kind.*' He will submit to the introduction of a trifling defect, in order that he may profit by a great excellence; and between excellences perhaps somewhat incompatible, he will decide on which is the greatest, and give it the preference.*

"To a person commencing improvement, the best advice is to get as good a bull as he can, and if he be a good one of his kind, to use him indiscriminately with all his cows; and when by this proceeding, which ought to be persisted in, his stock has, with an occasional change of bull, become sufficiently stamped with desirable excellences, his selection of males should then be made to eradicate defects which he thinks desirable to be got rid of.

"He will not fail to keep in view the necessity of good blood in the bulls resorted to, for that will give the only assurance that they will

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* "A person would often be puzzled; he would find different individuals possessing different perfections in different degrees:—one, good flesh and a tendency to fatten, with a bad form: another, with fine form, but bad flesh, and little disposition to acquire fat. What rule should he lay down, by the observance of which good might be generally produced, and as little evil as possible effected? UTILITY. The truly good form is that which secures constitution, health, and vigor: a disposition to lay on flesh with the greatest possible reduction of offal. Having obtained this, other things are of minor, though perhaps sometimes of considerable importance." —*PrizeEssay*, by the Rev. H. Berry.

transmit their own valuable properties to their offspring; but he must not trust to this alone, or he will soon run the risk of degeneracy. In animals evincing an extraordinary degree of perfection, where the constitution is decidedly good, and there is no prominent defect, a little close breeding may be allowed; but this must not be injudiciously adopted, or carried too far; for, although it may increase and confirm valuable properties, it will also increase and confirm defects; and no breeder need be long in discovering that, in an improved state, animals have a greater tendency to defect than to perfection. Close breeding from affinities impairs the constitution and affects the procreative powers, and therefore a strong cross is occasionally necessary."

The dairy-farmer, however, is less concerned in this high breeding than the grazier; yet he is not by any means indifferent in the matter; for his aim ought to be, to obtain a breed no less valuable as milkers than for their disposition to fatten when the milk is dried. These two qualifications are not to be attained very easily; yet they may be, and, indeed, have been attained, and especially among the improved short-horn breeds, as those of Durham and Yorkshire, or the cross-breeds between the old Shropshire, and the Holderness. The breeds most valued in the great dairies around the metropolis are mixed between the Yorkshire, Holderness, and Durham. For quality and quantity of milk they are eminent; they yield, on the average, each cow, two gallons of milk at a time, and often nine quarts; and when dry, they are in general readily fattened for the butcher.

With respect to the points of symmetry in cattle, of which the various breeds exhibit several degrees of modification, there are certain rules which are generally acknowledged as applicable to good cattle of all kinds.

The Bull.—The forehead of the bull should be broad and short, the lower part, that is, the nasal part and jaws, tapering; and the muzzle fine; the ears moderate; the neck gently arched from the head to the shoulders, small and fine where it joins the head, but boldly thickening as it sweeps down to the chest, which should be deep, almost to a level with the knees, with the briskets well developed. The shoulders should be well set, the shoulder-blades oblique, with the humeral joint advancing forward to the neck. The barrel of the chest should be round, without hollowness between it and the shoulders. The sides should be ribbed home, with little space between them and the hips; the whole body being barrel-shaped, and not flat-sided. The belly should not hang down, being well supported by the oblique abdominal muscles, and the flanks should be round and deep. The hips should be wide and round, the loins broad, and the back straight and flat. The tail should be broad and well-haired, and set on high, and fall abruptly. The breast should be broad; the fore arms short and muscular, tapering to the knee; the legs straight, clean, and fine-boned. The thighs should be full and long, and close together when viewed from behind. The hide should be moderately thin, with a mellow feel, and movable, but not lax; and it should be well covered with fine soft hair. The nostrils should be large and open; the eyes animated and prominent; the horns clean and white.

The Ox.—In the ox, the masculine characters, so prominent in the bull, are softened; the neck is carried nearly straight from the top of the shoulders, without an arch; and the general frame is lighter, but the points of excellence are the same.

The Cow.—Cows of a coarse, angular, gaunt figure may give good milk, and that in abundance, as, indeed, was the case with some of the old unimproved breeds; but it is desirable, and moreover it is possible, to unite qualities as a milker with such an aptitude to fatten as will render her valuable when dry, and profitable to the butcher. In a cow thus constituted, the head must be long, rather small and fine; the neck thin and delicate at its junction with the head, but thickening as it approaches the shoulder and descends to the chest; the breast should be at least moderately broad and prominent, with a small dewlap; the chine should be full and fleshy; the ribs well arched, and the chest barrelled; the back straight, the shoulders fine, the loins wide, the hips well formed and rounded, the rump long; the udder should be moderate, with a fine skin, and of equal size both before and behind; the teats should not be too large or lax, and they should be equi-distant from each other. If the vascular system be well developed, the milk-vein, as it is termed, is generally large; and though this vein is not connected with the udder, but carries the blood from the foreparts to the inguinal vein, still it has been taken, and with some justice, as the criterion of a good milker. The eyes should be clear, calm, and tranquil, indicative of a gentle temper; the skin thin, but mellow; and the hair soft. Cows thus admirably formed will often yield from twenty to twenty-four quarts of milk daily, and some, in the spring time, in good pasturage, even thirty, or more. The milk may, perhaps, yield less butter in proportion than that of some other breeds of cattle; but it would appear that, as the cow advances in age to her sixth and seventh year the milk becomes richer; and it is well known that the extensive dairymen of London prefer a cow which has had a third or fourth calf, and is five or six years old, to a younger animal.

We are perfectly aware that Mr. Culley ("Observations on Live Stock,") considers it as an impossibility to unite good milkers with good feeders; for, he says, whenever we attempt both, we are sure to get neither in perfection:—"In proportion as we gain the one, in the same proportion we lose the other; the more milk, the less beef; and the more we pursue beef, the less milk we get. In truth, they seem to be two different varieties of the same kind, for very different uses; and if so, they ought most certainly to be differently pursued by those who employ them. If the dairyman wants milk, let him pursue the milking tribe; let him have both bull and cows of the best and greatest milking family he can find; on the contrary, he that wants feeding or grazing cattle, let him procure a bull and cows of that sort which feed the quickest, wherever they are to be found. By pursuing too many objects at once, we are apt to lose sight of the principle; and, by aiming at too much, we often lose all. Let us only keep to distinct sorts, and we shall obtain the prize in due time. I apprehend it has been much owing to the mixing of breeds and improper crossings that has kept us so long from distinguishing the most valuable kinds." Mr. Culley wrote in 1807, and since his day many improvements have taken place in the breeds of cattle; and experience has proved, that the improved Yorkshire cow, in which the characters of the Durham and Holderness are mingled, unites the two qualities in high perfection.

Reproduction, Rearing and Fattening.—The heifer ought not to be permitted to breed until over two years old; the reason is obvious. Her own system before this period is not sufficiently matured for the tax upon it—a tax which will be paid not only by the dam, but also by her progeny, for both will suffer from a deficiency in nutriment, the whole of which is necessary for the growth of the former, which during the second year is rapid. If the bull be kept separate from the herd of cows, the farmer may regulate the succession of calves almost at pleasure, so as to suit his pasture or his arrangements. The best time as it respects the mother, the calf, and the free supply of milk, is when the spring grass is beginning to shoot luxuriantly, affording a good and sufficient store of nutriment. It is true that veal and butter yield a better profit at an earlier period, but the breeder must judge in points of this nature from circumstances. The period of gestation in the cow is generally stated as nine calendar months, or 270 days; but there is often considerable variation of time. M. Tessier observes (in a memoir read to the Royal Academy of Sciences in Paris), that the shortest period, as far as his opportunities of observation enabled him to ascertain, was 240 days, the longest 321; the difference being eighty-one days.* This range of time is very extraordinary, and appears to depend on the care paid to the animal, and on its state of health; by which the development of the calf is influenced through the sanguiferous system of the mother. With respect to the bull, he does not attain to a due degree of strength till two years old, and is in higher vigor at three; but how long the breeder may keep him after that age must depend upon his own judgment, and a variety of circumstances. The cow seldom produces more than a single calf, sometimes, however, twins, and very rarely three. In the case of twins, if they be respectively male and female, the female is generally, but not always, unproductive.

It is sometimes desirable that the farmer should possess the power of *controlling the ratio of the sexes in the animals he breeds.* The wonderful ratio in which they are produced in nature, is one proof of the all-wise provisions of the Almighty in making them subject to certain laws. Many investigations have been made to show how far this is within the control of man. A dairy-man is particularly interested in the production of heifer calves, wherewith to increase his dairy stock; a grazier may be equally desirous of producing bullocks for large weights and summer grazing; while a breeder for sale may be anxious to see a goodly proportion of bulls. How far he can control this production is a question of interest and importance. Hofkener, a German, made some calculations as regards the human species, which tended to show that where the father was younger than the mother, the proportion of male

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* In the *Bulletin des Sciences*, by the Soc. Philomatique, Paris, 1797, M. Tessier says, that out of 160 cows, some calved in 241 days, and five in 308; giving a latitude of 67 days.—See Sir E. Home's Paper on Phil. Trans. Part 1, for 1832.

births to females was 90.6 per cent.; when of equal age, 90 per cent.; but when the age of the father was greater than the mother, nine to eighteen years, it was 143 per cent.

Similar in principle was the experience of M. C. C. de Buzareurgnes, who professed to have the power of controlling the sexes in sheep; his principle being the same as the above, viz, that vigor was favorable to female, and the converse to male births. For females he proposed to select young rams, and place them in a good pasture; for males, three to five shear animals, and to place them in an inferior pasture. His experiment was successful. In his female trial there were seventy-six female lambs produced against thirty-five males; and, in his male trial, there were produced eighty males against fifty-five females. Another trial was made by M. Cournuejouls. One section was put to young male lambs, and on a good pasture; the other on a poorer pasture, and with old rams. The result was, that in the first experiment there were fifteen males and twenty-five females, and, in the second, there were twenty-six males and fourteen females.

Buzareurgnes also showed that in several lots the approximations to male or female births, were also in the ratio of the ages of the animals on both sides. Thus, of the young ewes put to the young rams, the two-year old ewes produced fourteen males and twenty-six females, the three-year old gave sixteen males and twenty-nine females; whereas the four-year old ewes, to the aged rams, and on the poor pasture, produced thirty-three males and fourteen females.

More than this is not known; but there is quite sufficient to indicate that the breeder possesses at least considerable power in controlling the proportion of the sexes, and that the more vigor he has of frame and food, the greater will be the proportion of females; and that the converse of this will hold equally good. There is enough in the principle to deserve a trial.

We now proceed with details descriptive of the management of cattle, under the heads of rearing and fattening. The first object being to secure a suitable breeding stock, and a provision for proper buildings for their accommodation and shelter.

Rearing.—It is most advantageous to have the calves drop in the early part of the year, that the young grass may be ready for them about the time of weaning. New milk is best for the young calf for the first fortnight, when it may be trained to feed upon other food, such as linseed-cake, or sweet hay; and when it will eat these freely, its allowance of milk may be gradually reduced, and sliced Swedes or carrots added to its food. The cribs should be kept clean, the food regularly supplied, and the calves themselves should always receive kind and gentle treatment. Perseverance in such management will greatly aid the growth of the young animals; when kindly treated, there will be no restless excitement on the approach of strangers, and they are easily managed when surgical operations become necessary from disease or accident. All graziers are fully alive to the importance of docility in all fatting animals.

After three or four weeks the male calves may be castrated, an operation attended with less risk and pain when done at an early age. It is advisable to keep the calves in separate cribs until five or six weeks old, after which they may be turned together into a comfortable house, with sufficient room for exercise. And when the pasturage permits, and fine weather is well established, they may be turned out, at first for a few hours only in the middle of the day, to inure them to the change. As winter approaches, they must again have the shelter of a comfortable yard, and be supplied with roots mixed with straw-chaff. An addition of one pound of oil-cake in summer, and two pounds to their ordinary food during winter, will greatly assist their condition and early maturity. The yards should, of course, be well sheltered and littered, and cattle of the same age and size have separate inclosures, otherwise the weaker beasts will be driven about by the master ones. In the spring the young cattle are again turned to grass, and the treatment continues in a similar manner until the cattle are fattened off at home, or are sold off for that purpose into other districts. By liberal feeding whilst in a young state, the cattle are kept in good condition and rapid growth.

We believe that food for calves may be prepared of a much more nutritious nature, and much more likely to be of advantage to the producers; some of these, on which we have successfully reared calves for several years, we shall place before the reader:—

1. **Wheatmeal Porridge.**—This is made in the following manner: boil two gallons of water, and mix a pint of fine flour with cold water, sufficient to make it into the consistency of a thick cream. This should be thoroughly mixed, and put into a bowl capable of holding half a gallon; a small quantity of the hot water is added to the mixture, and stirred so as gradually to raise the temperature of the flour and water in the bowl, and prevent it from running into lumps. This is plunged into boiling water, and stirred until the whole boils again. This coagulates the mass, and forms a thick nutritious porridge. It is a great improvement to the mixture if one-sixth part of old skimmed milk is mixed with it; which not only gets scalded itself, but very materially improves it. Two gallons of the mixture per day will be found sufficient.

2. **Linseed Jelly** combined with the milk, is a very valuable auxiliary. We ourselves have scarcely tried the seed by itself sufficiently to be able to give a very decided opinion upon it; and we much prefer the pressed seed, in the shape of cake, crushed to a powder; and, for this reason, if we wanted to lay on the fat, we should give them the crushed seed, because its fatty matter would, when cooked, be easily assimilated into animal fat; but when bone and muscle are to be formed, every pound of fattening matter in the food displaces other substances calculated to build up the animal structure; for this reason we most approve of the jelly produced by the crushed cake. The proportions of the crushed cake to the water should be as follows:—to two gallons of water take two pounds of oil-cake bruised or crushed nearly to a powder, sprinkle it in the water, stir, and allow it to boil ten minutes. Cool with skim-milk, if convenient. A rich jelly-like mass, of the most nourishing kind, is produced, which should be given in a lukewarm state.

3. **Broth Porridge.**—This is a somewhat unnatural mixture; but it is often used very successfully, combined with other mixtures, for feeding calves. The water in which bacon has been boiled is carefully preserved,

and diluted with perhaps one-half of its quantity in water. It may be expected that a substance like bacon, from which nitrogenized and phosphoric matter may be expected to be dissolved by the action of boiling, will be of use; but, to make it alimentary, it is necessary to mix it with a considerable proportion of milk. However unnatural this mixture may appear; how contrary soever to all theories of natural history it may be to give carnivorous matter to herbivorous animals, we may find in it an analogy by no means unimportant, in the disposition evinced by mature animals of this description to select and chew, for hours together, a piece of bone, which they will search for with instinctive pertinacity, and relinquish with reluctance. Is it not because she finds in it the nitrogen or the phosphates denied her in the food upon which she is confined? And if this be so—if she is guided by her instinct to select and choose animal matter, why may not a decoction of animal substance be useful to the calves, in their younger stages, as an auxiliary, and, to a certain extent, a substitute for the beverage which nature has given them, but which man denies them.

Solid Food for calves will soon, however, displace much of the liquid. At five or six weeks old, they ought to be trained to eat sliced roots. To do this it is only necessary to supply them in convenient forms in a trough within their reach. Their moments of leisure will be employed in playing with and sucking these pieces, until they begin to masticate them. The roots should, for this purpose, be cut into oblong pieces, one inch broad, half an inch deep, and two inches long; these shapes are better than either slices or squares, being more adapted to their conformation, and better calculated to make them learn to eat of their own accord. Calves should be reared from the months of September to March. We do not approve of late-bred calves; if they are reared late, they become tender and require nursing the following winter. In the months we have named, however, turnips are always plentiful; or, if mangel-wurzel is cultivated, it will be found a very successful substitute; although we prefer Swedes. These appear not only to agree with the palate of the animal and to make it thrive, but they exercise a very beneficial influence on its subsequent development. Is it because they contain a large share of the phosphates? Sprengel makes the relative proportions of the phosphates in the Swedes to be nearly six times as great as in the common turnips, and sulphate ten times.

	Phos. acid.	Sulph. acid.	
Common turnips	73	41	per 1000 lbs.
Swedes	408	890	

Other auxiliaries are sometimes adopted, such as bean-meal, pea-meal, oatmeal, cattle sago, and Indian meal; all these being very material aids in rearing calves.

CATTLE-FEEDING.—This question is one of economy simply: *how can the largest number of pounds of beef be produced at the least possible cost?* This is the real question still unsettled, and on this we will proceed to show the present extent of our knowledge.

First. The grazier must select such animals as will lay on fat rapidly; and, by a physiological law, as we have seen, there are those which will soonest attain maturity so as to be fit for feeding. We stop not now to examine whether or not the two principles of taking on fat early as well as rapidly are necessarily connected—though it is very probable they are—and that a tendency to lay on fat will show itself at a very early period of the animal's history; though it may possibly be a mere result of the breeder's skill to obtain the two qualities combined.

Now, every good grazier knows an animal which will thrive, that being a simple matter of judgment. A skillful man will select out of a drove, five, or ten, or twenty animals, and nineteen of the twenty will be the best grazers for his particular farm. The eye guides him partially—the signs we have described in our remarks on the breeds of cattle also—but more than all he is directed by the touch.

Having selected the animal, the mode of feeding him is to turn him out into a grass field skirting a river—if such be within the grazier's power—where alluvium of ages has been washed into the soil so deep that the roots of the herbage cannot find its bottom, and so firmly comminuted as to admit of the minutest filaments of the radicles of the plants to penetrate it with facility, so porous as to admit the air to enter, and the water to filter gently through, and containing its elements in a state of solution so delicate that they are ready for food to the plants which consume them; but last, though of greater importance than all, having the elements of vegetation in plentiful abundance. Now, all men know that on such a soil, in five, six, or even in four months, a lean animal will become fat. He has all he requires—a little attention to see that he is well is all that is needed, from the time of his being placed in the pasture to being taken out to the butcher. There is neither labor, pains, or expense incurred. He is worth twenty-five dollars more when he is taken out than when he was put in, and that is all the grazier knows or cares for. Now, we shall find out the requisites here for feeding, strictly laid down. There is plenty of fresh and highly nutritive food; there is scarcely any labor in searching for and obtaining it; with water, and shelter, and warmth; and also plenty of air, and freedom from constraint.

Now, this is what the feeder must aim at in his winter-fed cattle. They cannot feed in the open air; the cold and wet would deprive him of the flesh as fast as the food laid it on. Here he must provide shelter. Now one of the controversies of cattle-feeding in winter is, which is the best mode of providing this. The Scotch farmer loudly contends for full and perfect liberty to the animal. If he is too warm he will sweat, and if too closely confined he will fret and murmur; and he declares that practice has decided that they should be fatted in open places; a sheltered shed they may have, but nothing beyond it. The midland counties man says this exposure is dreadful. It wastes their beef, and renders them subject to disease, and involves long feeding. Another class again insist on the tying up of the animals as injurious to their health; that a little exercise, but absolute confinement, are equally necessary; and that they should have shelter with freedom—these two classes are controverting the merits of box and stall-feeding.

And both of them are right. Take a Highland Scot, consider his wild habits, his long stray of mountain and glen, his wide-spread pasture of peat and heather, from which he could in his native fastness smell afar off his friend or his enemy man! Tie him by the head and he becomes fretful or furious; he will pine, and fret, and worry himself, while, in his gregarious state, with a herd of his fellows in open yards, or sheds, he will thrive. Nay, he has a nature which will lay on fat despite the cold and wet, as the rye among plants can assimilate food from the barrenest soil; so he has a natural shelter in his hair and constitution, for which the owner of more delicate and tender animals will not give him credit, forgetting that the Scotchman has a different animal to deal with in his shed-feeding from the short-horn.

The short-horn feeder, on the contrary, possesses a tame, quiet, gentle, lethargic animal, which shows that universal mark of good breeding in men and animals—he is always quiet. He will neither pine at never beholding the light, nor feel the want of exercise if he never leaves his stall, provided he has food and comfort in plenty. Nay, he will hardly take the exercise necessary to keep his limbs in healthy action. But keep him from the cold and wet; prevent the blast from passing over him; he likes protection, and thrives best in boxes.

Take a Devon, or, if you like, a Sussex ox. He is large and cumbrous; but he is active. Give him liberty, and he will roam and harass himself; but he is tame enough to keep to his stall without pain or fretting. He requires a stall.

The Temperature at which it is desirable to keep feeding animals is a matter of more importance than might be inferred from the apparently small amount of investigation bestowed upon it. The question is, are we to run the risk of a wasting expenditure of food by perspiration under excessive heat? or are we to induce them to waste it, to keep up animal heat, by exposure to too much cold? Nay, will not different classes of feeding animals be subject to different consequences, from the same degree of heat? In the same cow-house there may be some too hot, and others too cold, from their different constitutions. Oxen generally sweat at a temperature in which heifers thrive admirably; this happens at any rate till Christmas, after which they seem to be able to bear the same degree of heat as female animals.

H. S. Thompson, Esq., tied up two sets of feeding bullocks, eight into a warmer shed than the rest. They had the same quantity and kind of food; but those in the warmer shed made more beef than those in the colder, showing that warm air, as well as warm food, was highly favorable to fattening short-horns; which breed, we believe, he invariably fattens. The temperature he aims at is about 55° to 60° of Fahrenheit; an increase of this caused them to get off their food, and lose their tone and appetite.

Stillness, with the limitations given in our remarks on shelter, is necessary to successful feeding. This is well known to geese feeders, who even nail them to the boards; and it was shown very strikingly by Mr. Childers, M.P., in his experiments on shed-feeding, and by Lord Bathurst, on stall-feeding sheep. An animal in the very effort of searching and securing his food, expends the principle necessary to make fat; hence it is necessary that his turnips be brought to him instead of driving him to the turnips. They are cut and placed before him, that he may have as little effort as possible in the operation of chewing, and he has ample allowance of room, so that when he has fed, he may lie down and sleep.

It is a question whether animals feed fastest in the dark or not. There can be no doubt whatever that any thing which distracts their attention, which excites action, or which produces nervous irritation, is opposed to fattening; and, as darkness will induce sleep, inaction, and promote quietness, it is so far favorable; but it is not so easy to have darkness and sufficiency of fresh air at the same time, and therefore the best possible state, perhaps, is to have the feeding-houses rather in a state of shady gloom than in absolute darkness. A certain amount of nervous energy is necessary to give tone to the vital powers, and, beyond this, repose and quietness are easily attained by a simple gloom, while shelter from flies and heat in summer, and from blasts, wet, and extreme cold in winter, should be carefully provided.

Abundance of Good Food and Regularity of Feeding, are essentials in all kinds of fattening. Though it is not desirable to allow the animals to have food standing before them when they are filled, they should never, on the other hand, experience a single feeling of want. The usual hours of feeding should be strictly adhered to, for the two-fold purpose of inducing regular periods of sleep and for supplying the system with food at the first call of appetite.

Variety of Food is a most essential element of rapid fattening; and it is not far from the truth to say that all kinds of food are *equally* fattening, if they are given in sufficient variety. If roots, grain and hay be changed every few days, the appetite is never cloyed; and the whole are devoured with a relish which develops fat in the most rapid manner.

The Formation of Fat is the work of the grazier. His animals are generally full grown, or nearly so, and, though there may be a small increase of muscle, still the bulk of the material of increased weight is *fat* and not *flesh.* In this country, food to be palatable—to be consumable—must be fat: unless it has this recommendation it is absolutely unsalable. The appetites of the higher and the necessities of the lower class, urge on the demand for fatted beef, mutton and pork; and any brought to market in a state other than fat, is looked upon as carrion. Hence the grazier must supply the whole of his animals in a fat state to the consumer; and therefore it is not the number of animals, nor their weight he has to consider, but he has to provide for them the means of fattening before they can be brought to the consumer.

The saccharine matter of vegetables, and their starch, will supply the means of fuel-food; the fatty matter will produce ready-formed fat to deposit; and the albuminous matter will afford the flesh which waste is continually throwing into the excretory system, and for the small additions which may be necessary to carry the requisite amount of fat.

It is not not our intention to enter into the dispute between the two schools of physiologists, as to whether the fat was formed by transmutation of the sugar and starch of the food, or whether it consisted of the ready formed fat of the food on which the animals fed. Without for a moment pretending to settle this point, it is at least desirable so far to supply both saccharine and fatty matters, as to give the system the choice of selection.

Preparation of Food for the animal's stomach, or a system of cooking, is a very important question. Steaming hay, potatoes and turnips, has been tried very carefully in Scotland, and failed. For *cattle*, at least, it is useless; how valuable soever it may be for pigs. It is pretty certain, however, that, with certain combinations, all that a feeder can desire is attained by the *cooking of flax-seed.*

The fat of animals is strictly analogous to vegetable oil; its elements are much of the same character as sugar, starch and gum, and no doubt is entertained, by physiologists and chemists, that the fatty matter (vegetable oil) in plants, is assimilated into animal fat, with but little change. The elements of those compounds severally are:—

	Sugar.	Starch.	Gum.	Mucilage.	Animal fat (stearine).
Carbon	12	12	12	24	71
Hydrogen	11	10	10	19	69
Oxygen	11	10	10	19	7

The oil contained in many seeds is given by Professor Johnston—

	Oil per cent.		Oil per cent.
Flax-seed	11 to 22 say 17	White mustard	36 to 38 say 37
Hemp-seed	14 " 25 " 19	Sweet almond	40 " 54 " 47
Rape-seed	40 " 70 " 55	Bitter do	28 " 46 " 37

This would naturally indicate that any of these seeds would, so far as they were palatable, be useful; and when linseed contains as much as seven per cent. of mucilage, ten per cent. of sugar, and fifteen of soluble albumen, it is clearly indicated as being a seed most valuable for feeding and nourishing purposes.

Various attempts have been made to adapt it to the feeding of cattle. There was some difficulty in grinding it by ordinary mills, as it clogged up the teeth; and when given to animals either alone, or combined with considerable quantities of corn, meal, or other feeding matter, the effect on the animals was purgative, and but few breeders persevered in the use of the seed alone. The demand for the oil, however, induced the crushing of the seeds to obtain it, and the refuse left was found to be very valuable as feeding material; while the portability of oil-cake, its cleanliness, and capability of being long kept, made it a general and desirable food, both for growing and feeding stock. The oil abstracted, the cake contains, according to the same authority:—

Water	10.05
Mucilage	39.10
Albumen and gluten	22.14
Oil	11.93
Husks	9.53
Saline matter and sand	7.25
	1.00

We do not see exactly how the cake can contain so large a proportion of oil relatively with the seed; but it is probable that the seed had originally contained a large proportion of oil, and that it had been but indifferently crushed. Good English-made cake, however, has been thoroughly established as one of the best of fattening products; and the extensive farmers of Lincolnshire and other places expend upon a single farm, in one year, as much as £400 to £500, for this article of food; and so well understood is its fertilizing character, that many land-owners are willing to make themselves and their incoming tenants, chargeable with proportions of the money so expended, at the rate of one-half to one-third. It is the opinion of some of the best farmers, that when cake can be purchased at the same price per ton, in pounds, that beef and mutton can be sold at per stone in shillings, it will be paid for in the cattle and animals fed, without reference to the manure.* The price of cake, however, depends on no such element of calculation; the demand for it has increased far beyond that of the oil, and in some seasons it has been so great, that the former became an object of commerce rather than the latter.

Attempts have been occasionally made to render the uncrushed seed available by a cooking process, but it has been generally found more adapted for calves than for store stock or for fattening; where used at all for the latter purpose, it has only been to supply a deficiency in turnips.

The most decisive step, however, in the use of cooked linseed, was taken by Mr. Warnes, of Trimmingham, near North Walsham, in Norfolk, in 1841, when a discussion was appointed by the Farmers' Club there, on feeding cattle with linseed cake. Mr. Warnes commenced by inquiring into the nature of cake. He immediately commenced a series of experiments with flax-seed in various forms—both crushed, steeped, boiled, and cooked in various ways. He also tried the boiling of barley and other food on various animals. He ultimately adopted a mode of feeding, on what was called by him flax-seed compound. He carried out, in connection with his experiments, growing, dressing and preparing the flax, the feeding of cattle with the prepared seed in boxes as antagonist to tying up, and the summer grazing of cattle by soiling.

His cooking apparatus is so simple, that it is managed by a blind man, whose happy countenance bespeaks neither over-weening anxiety, nor unremunerated toil. The apparatus consists of two cast-metal boilers, fixed in brick, and having a fire-place beneath them; the water is made to boil before the flax-seed is put in. The seed is crushed by a very powerful implement, consisting of two cylinders, one of them being of large diameter; they are made to press upon each other in their revolutions by two lunar springs, and two men will thoroughly grind two bushels in ten minutes; at this rate the men are able to work the whole day. The mill is, however, capable of being reduced to the capacity of one man. The crushed flax-seed is sprinkled upon the boiling water at the rate of one gallon of seed to eight gallons of water; great stress is laid on sprinkling the seed very gradually, otherwise it is apt to adhere in lumps, and cleave to the sides or bottom of the boiler. With this precaution, however, Mr. Warnes assures us he has had no instance, for several years, of this occurrence. This mixture is boiled six minutes, and for that period is slightly stirred; at the end of that

* The pound sterling is $4.85; the shilling is 24 cents; the stone weight 14 lbs.

time it is found to be a thick gelatinous mass. In one minute after this the mass became more mucilaginous, and was improved. Nine bushels of cut pea straw were then placed very gradually, and by one bushel at a time, in a tub twenty-eight inches high; the liquid jelly was now taken out in a scoop, poured upon it, and as each addition was made the whole was rammed down by a kind of beater, more for the purpose of mixing the mass, and confining the heat, than for any other object. The present cost of the animals in flax-seed is 3s. per head per week. In addition to this, they have also about one bushel of cut Swedes per day.

Mr. Warnes occasionally mixes his compound with meal. This, when used, is also sprinkled over the boiling mucilage. So soon as the first boiling was nearly emptied from the boiler, it was again filled with water, and was ready for another boil, when required.

As a test of its value, Mr. Warnes furnished the following remarks and experiments illustrative of the effects of his system: "Flax-seed," he says, "has five essential properties, namely, mucilage, oil, albumen, gluten and sugar. The shell, or external crust, is the hardest of all seeds, and the most difficult to break in pieces; but not too hard for the miller, who has every particle ground almost to powder, in order that all the oil may be expressed, which it could not be if coarsely crushed. This is demonstrated by the cake, in which the presence of seed is scarcely apparent. To a similar state seed for the cattle compounds ought to be reduced; otherwise some, at least, of the properties above described will pass off without benefit to the fattening animals. This the scientific grazier will discover by the excrements, in which he will find sufficient cause for grinding, not only flax-seed, but all grain or pulse, if possible, into flour. From researches like these the profitable returns for grazing upon my premises, may be dated." The expenses of this copper, with the whole working apparatus for eighty or one hundred head of stock, will not be more than four pounds.

A part of Mr. Warnes's system is the feeding in boxes, the growth of flax-seed, the manufacture of the fiber into flax, and the soiling of cattle with green food and compound in summer. It would swell this article much beyond its legitimate limits, if the box system were more fully described. It may suffice to say, that the boxes at Mr. Warnes's have been put up very cheaply—they form two sides of what has formerly been a fold-yard. The sides have had a roof put along the wall, supported by pillars of wood, and divided by rails of any ordinary wood; the front next the yard being inclosed by two gates. The box is eight feet six inches square; and adjoining the wall is a passage from which the food is given in troughs, which are made to slide up or down as the manure accumulates. The manure is never carted out until it is taken to the fields; and, as the boxes are walled for one foot from the bottom, there is not the slightest escape of the liquid manure or of the ammonia, and therefore it is peculiarly rich, from this circumstance and from the stimulating food supplied to the fattening animals.

Much has been said as to the dirt and filth, and unnatural state of the animals; but their condition is precisely the reverse, in every respect; they are quiet, have exercise sufficient for healthy secretion, can feed at leisure, and, whenever we observed them, they were clean and free from smell, and every thing objectionable. The fact of the treading, and thorough consolidation by the animals' feet, prevents fermentation, and the consequent evolution of gases which would take place if mere stall-feeding were practiced. On the whole, we think there are many more valid reasons in favor of than against box-feeding.

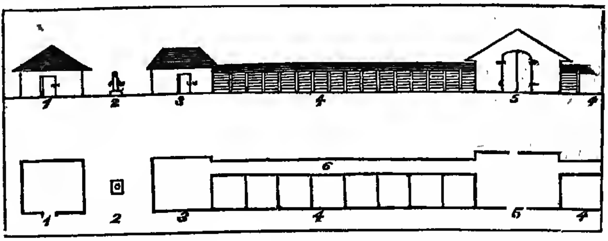
The direction given to men's minds by the experiments of Mr. Warnes, induced trials with all kinds of modifications of flax-seed cooking; but the one which has obtained the greatest amount of favor is that adopted by Mr. Marshall, near Thirsk. The great difference between Mr. Marshall's plan and that of Mr. Warnes, is, that the material cooked has not the heat applied to it directly, but to the outside of the boiler in which it is to be cooked, so that no direct application of the fire shall take place to burn the mucilaginous matter. Mr. Marshall insists that, to cook the material properly, it must be boiled at least two hours.

His mode is this:—one pound of flax-seed is boiled for two or three hours in about one and a half gallons of water. Five pounds of straw are chopped, say one inch long, and mixed with two and a half pounds of ground oats or barley meal very intimately, which is then placed on a floor of flags of bricks, and the boiled seed poured upon the mass, and turned, and then allowed to cool one or two hours, when it is given to the cattle.

The cost of the apparatus or fitting will be about £50 (or $250.) On the whole we think it very desirable to adopt one or the other process in all situations where an increased quantity, and better quality of manure is a desideratum, not to mention the more profitable return, as exhibited in both the systems described.

Mr. Warnes, altogether unprejudiced in favor of his own peculiar system, has been experimenting on the mode recommended by some graziers, of steeping the linseed-meal in cold water for some twelve or fourteen hours,—when a slight mucilaginous deposit was the result. The experiment will no doubt be carefully and accurately made under his directions; but, we confess, our prepossessions are in favor of the cooked materials.

The following is a plan of Mr Warnes's shed boxes for cattle-feeding:



1. Cooking-house, 20 by 16 feet.
2. Pump.
3. Storehouse, for roots, &c.
4, 4. Boxes averaging 90 square feet each.
5. Fodder-house, with tank under the floor.
6. Passage, 4 feet.

Mr. Thompson, of Moat Hall, Yorkshire, a most skillful and accurate investigator, made some very important experiments as to the relative value of *hot and cold preparation* of flax-seed. He took two animals, and fed the one on hot and the other on cold food. He had both weighed before he started, and both again weighed at the expiration of six weeks. The animal fed on cold food weighed, when put up, 107 stone 11 lbs. (1,509 lbs.); that fed on hot, 108 stone 7 lbs. (1,533 lbs.) At the end of six weeks the first had gained 40 lbs.; while the last, the one fed on hot food, had gained 71 lbs. To guard against the one having any special aptitude to fatten which the other did not possess, he reversed the order; and then it turned out that the animal now fed on cold food, and before on hot, gained 53 lbs., while the other, now fed on hot food, gained 71 lbs.

But not only on the animals did the results of cooked food show itself in this striking manner; for, while one fed on hot food had only 80 lbs. of Swedish turnips per day, the one fed on cold food was not satisfied till his feed was increased to 87 lbs. of turnips in the same time, showing a greater consumption of other food to make up for the want of heat!

Food as Affecting the Quality and Quantity of Milk.—Messrs. Dumas and Boussingault tried a number of very careful and interesting experiments on the quantity of milk and its products which would be given by cows fed on different kinds of food. They tried nearly all the combinations usually given, except perhaps bean meal, and the result was, that the greatest quantity of milk was given when the cow had green clover, in every case, *i. e.*, that in each instance this yielded the greatest quantity of butter, and, with one exception, the greatest produce also of cheese; and that exception was when the cow had been but one day calved, which would account for the abundance of cheesy matter in the milk. The table is so instructive, that we will quote one or two of the items:—

Food.	Days after calving.	Milk.	Butter.	Cheese.
Potatoes and hay	176	9.3	4.8	3.3
Hay and green clover	182	8.9	4.5	4.0
Green clover	193	9.8	2.2	4.0
Clover in flower	204	7.8	3.5	3.7
Potatoes	229	5.0	4.0	3.4
Turnips	207	6.0	4.2	3.0
Red beet	215	5.6	4.0	3.4

Into their philosophical investigations and reasonings we shall not enter. Mangel-wurzel, bean meal, and grains, much increase the milk.* Good hay and oat mash much increase the butter, and turnips, though they give a disagreeable flavor, greatly increase both.

To keep the cow as *long as possible in milk* is sometimes an object. Some cows dry early,—some may be milked through, though always with disadvantage to both the cow and the calf; both being feeble and impaired, if it is persisted in. In summer weather, however, when cows are very deep milkers, and in high condition, it is not only sometimes

* Indian meal fed in cool weather, while it is a highly nutritious food, also adds greatly to the quantity and quality of the milk. The erroneous prejudice against its use for milch cows has been fully refuted by careful experiments.

advisable but absolutely necessary. A cow not put to the bull will hold to her milk much longer than one which is regularly breeding.

THE DAIRY—BUTTER AND CHEESE MAKING.—In all dairy establishments ventilation and cleanliness are indispensable; and if butter is made, the dairy proper, or butter-room, should be as near the cow-house as possible, as the milk suffers more or less considerably from being agitated, or too much cooled, before it is set for the cream to rise. The milk should be brought from the cows without being exposed to the outer air, before it is set to cream; which should be in vessels arranged on a stone slab, below the level of the ground; the apartment being sunk to the depth of three or four feet, and kept perfectly dry. The air may be admitted through perforated zinc plates, or woven-wire windows, placed opposite to each other, having shutters which may be opened or closed according to the temperature and state of the weather. Glazed windows may be added, and should be open, excepting in very hot or very cold weather. The situation should be dry, and well shielded from the north, east, and south.

The Dairy-House is, perhaps, of all other appliances, the one on which success most depends. It should be apart from all household operations, from open grates, and from dung-heaps, and should have as much as possible the means of an equable temperature. As, however, it is much easier to keep a cold building warm, than to cool a hot one, it is desirable that it should be as much as possible shielded from the sun's rays. It should have its side to the north, its end to the east, and should, if possible, be let into the earth a few feet, but not so deep as to interfere with the drainage. If covered by a large tree it would be all the better. Around it should be either a hollow wall, or peat earth should be walled round its exterior; or, as another alternative, and possibly the best but most expensive, it should be surrounded by a veranda. It should also have a double roof, and abundant top and side ventilation—either of which should admit of being closed. It is necessary to have in it a pump, the floor sloping, and on the highest part a perforated pipe should be connected with the pump, to allow of the cleansing of the floor with cold spring water when necessary. The bowls should either be earthen-ware or glass dishes, placed upon wooden tables—fir, maple, or sycamore are the best; or leaden bowls may be used, placed on frames, and surrounding the dairy. Stones are the best for the floors, and a lining for the walls of white pottery is not only elegant but useful; a pipe connected with the boiler attached to the kitchen fire is a great advantage, with a stop-cock, so as to regulate the heat of the room in winter. The scalding and churning rooms should be distinct from the milk-house, and the latter should be kept as free as possible from all kinds of foreign matter. An outer veranda is useful for drying the dishes and pails, and therefore desirable, when the dairy is sufficiently extensive to render the expense of its erection judicious.

Butter is the fat or oleaginous part of the milk of various animals, principally of the domestic cow. The milk of the cow is composed of three distinct ingredients—the curd, the whey, and the butter; the two first form the largest portion, and the last the most valuable. The comparative value of the milk of different cows, or of the same cows fed on different pastures, is estimated chiefly by the quantity of butter contained in it; and in this respect some breeds of cows are far superior to others. The union of the component parts of milk is chiefly mechanical, as they separate by subsidence according to their specific gravities, the cream being the lightest, and the curd the heaviest; the curd, however, requires a slight chemical change for its separation from the whey, which at the same time produces a peculiar acid, called the lactic acid. From the moment that milk is drawn from the cow, it begins to be affected by the air and changes of temperature, and circumstances almost imperceptible to our senses will materially affect its quality; hence the importance of extreme care in every step of the process of the dairy, especially in making butter.

The cows should be milked in the cool of the morning and evening; they should not be much driven immediately before milking, and it is best to bring them to the place of milking some time before the operation begins. In some situations it is better to milk them in the pastures and carry the milk home; in others to drive the cows gently to the cow-stalls. In mountainous countries the first mode is generally adopted, because the cows are apt to leap down steep places, and shake the milk in their udder more than is done by carrying it in the pail. The same practice holds good in Holland from another cause, which is the distance of the pastures from the home-stalls, and the facility of transporting the milk in small boats, all the best pastures being surrounded by small canals communicating with the greater; thus the milk may be carried several miles without the least agitation.

As soon as the milk is brought into the dairy, it is strained through a fine sieve or cloth, and it is then poured into shallow pans or troughs lined with lead. The best pans are of metal, either of iron, carefully tinned, or of brass. Such pans are cool in summer, and in winter allow of the application of heat, which is often very useful to make the cream rise. When leaden troughs are used, they are generally fixed to the wall, and have a slight inclination toward one end, where there is a hole with a plug in it, by drawing which the thin milk is allowed to run off slowly, leaving the cream behind, which runs last through the hole into the pan placed under to receive it. The milk in the pans or troughs is generally four or five inches in depth, which is found most conducive to the separation of the cream. The place where the milk is set should have a thorough draught of air by means of opposite wire windows. The sun should be carefully excluded by high buildings or trees, and the floor, which should always be of brick or stone, should be continually kept moist in summer, that the evaporation may produce an equal, cool temperature. A small stove in winter is a great advantage, provided smoke or smell be most carefully avoided, and the temperature be carefully regulated by a thermometer. In Switzerland men are chiefly employed to milk the cows, and in all the process of the preparation of butter and cheese. The women only clean the utensils, and carry green food to the cows when they are kept in the stable. When the milk has stood twelve hours, the finest parts of the cream have risen to the surface, and if they are then taken off by a skimming-dish, and immediately churned, a very delicate butter is obtained; but in general it is left twenty-four hours, when the cream is collected by skimming, or the thin milk is let off by taking out the plug in the troughs. All the cream is put into a deep earthen jar, which should be glazed, but not with lead; stone-ware is the best. More cream is added every day, till there is a sufficient quantity to churn, which in moderate dairies is every two days. It is usual to stir the cream often, to encourage a slight acidity, by which the process of churning is accelerated. This acidity is sometimes produced by the addition of vinegar or lemon-juice; but however this may facilitate the conversion of the cream into butter, the quality is decidedly injured by it, especially butter which is to be salted. It has been asserted by some authors that butter will not separate from the buttermilk until acidity is produced, and, no doubt, there is more or less of lactic acid in all buttermilk; but perfectly fresh cream, which has stood only one night and is churned early next morning, will generally produce excellent butter in a quarter of an hour or twenty minutes in summer, and no acid taste can be discovered in the buttermilk. The change by which the butter is separated in a solid form is accompanied by the development of heat in churning.

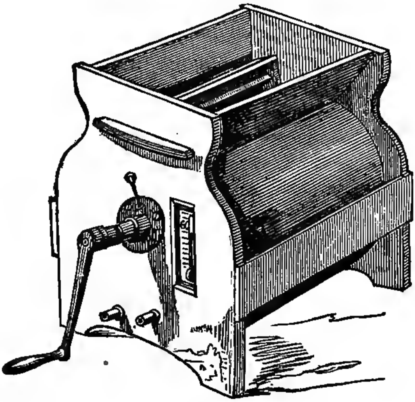


TABLE CHURN.

Churn.—As to the form of churn there may be a variety of opinions. The ultimate object is to secure that form which will facilitate a rapid, steady, and shaking pressure of the contents; and this is effected either by a flapper, driven through the cream, at a considerable rate, by means of a piston with a perforated base; by a perpendicular motion, raised up and down in a cylindrical or similarly formed vessel; or, what is more common, and by no means the worst form of churn, a cylinder studded with perforated beaters, fastened to its inner surface, and revolving round its two axles, admitting of one handle or two, according to the quantity of the cream. By this means the specific gravity of the cream, as well as the force and impetus of the machine, are both brought into play to excite the heat, the pressure, and the agitation necessary to the proper and speedy development of the butter. To this horse or steam power may be easily attached, and though there have been many forms of churn in use, we are not certain that any very great improvement on the above form has so far been discovered. Plans have been adopted to diminish the labor, but this has often ended in defective operation. The American and the table churns, available for the extemporaneous manufacture of butter every morning for the tables of the rich, are so far a step in advance, and a luxury; but for the large operations of the dairy-farmer, a better application than the churn of his forefathers has not yet been discovered.

Some experienced dairy-men pretend that the butter is deteriorated by much washing, and therefore they express the buttermilk by simply beating the butter with the hand, kept cool by frequently dipping it in cold water, or with a moist cloth wrapped in the form of a ball, which soaks up all the buttermilk, and leaves the butter quite dry. This operation requires the greatest attention, especially in warm weather, and no person should work the butter who has not a cool hand. The less it is handled the better, and therefore a wooden spoon or spatula is much to be preferred.

When it is entirely freed from the buttermilk, and of a proper consistency, it is divided into portions of the weight required, if it is intended to be sold fresh. But the greatest part of the butter that is made, especially at a distance from large towns, is immediately salted and put into casks, which usually contain fifty-six pounds, and are called firkins. The quality of the salt used is of great importance; if it be pure, the butter will keep its flavor a long time; but when it is impure, and contains bitter and deliquescent salts, the butter soon becomes rancid. The Dutch are very particular on this point. They use a kind of salt which is made by slow evaporation, and perfectly crystallized. The salt is intimately mixed with the butter. From three pounds to five pounds is sufficient for a firkin of fifty-six pounds.* The casks are made of clean white wood. They are carefully washed inside with strong brine made hot, and rubbed over with salt. The butter, being quite dry, is pressed close into the cask, a small layer of salt having been first put on the bottom. Every addition is carefully incorporated with the preceding portion. If there is not a sufficient quantity to fill the cask at once, the surface is made smooth, some salt is put over it, and a cloth is pressed close upon it to exclude the air. When the remainder is added, at the next churning, the cloth is taken off, and the salt, which had been put on the surface, is carefully removed with a spoon. The surface is dug into with a small wooden spade, and laid rough, and the newly-salted butter is added and incorporated completely. This prevents a streak, which would otherwise appear at the place where the two portions joined. When the cask is full, some salt is put over it, and the head is put in. If the butter was well freed from all the buttermilk, and the salt mixed with it was quite dry, it will not shrink in the cask, and it will keep its flavor for a long time. Should

* The following mixture has been found superior to salt alone in curing butter—half an ounce of dry salt pounded fine, two drachms of sugar, and two drachms of saltpetre, for every pound of butter.

there be an appearance of shrinking, the cask must be opened, and melted butter poured round it so as to fill up the interstices between the butter and the cask. There is a mode of preserving butter for domestic use without salt, in the following manner: the butter is set in a clean pan over the fire, and melted very gently; it is not allowed to boil, but is heated very nearly to the boiling point. Experience has shown this heat to be attained when the reflection of the white of the eye is distinctly seen on the surface of the butter on looking down into the pan. All the watery particles are then evaporated, and the curd, of which a portion always remains in the butter, and which is one cause of its becoming rancid, falls to the bottom. The clear butter is poured into an earthen vessel and covered over with paper, and a bladder or a piece of leather is tied over the jar to exclude the air. When it is cooled, it much resembles hogs' lard. It has lost some of its flavor, but it is much superior to salt butter for culinary purposes, and especially for pastry.

The Devonshire method of making butter is peculiar to that county. The milk, instead of being set for the cream to rise, is placed in tin or earthen pans, holding about eleven or twelve quarts each. Twelve hours after milking, these pans are placed on a broad iron plate, heated by a small furnace. The milk is not allowed to boil, but a thick scum rises to the surface. As soon as small bubbles begin to appear, where a portion of this scum is removed with a spoon, the milk is taken off and allowed to cool. The thick part is taken off the surface, and this is called clouted cream; it is a sweet, pleasant substance, more solid than cream, but not so solid as butter, and is generally considered a dainty. A very slight agitation converts it into real butter, after which it is treated exactly as we have before described.

Another method of making butter, which is more generally adopted, is to churn the milk and cream together. This method is pursued in parts of Holland, Scotland and Ireland, and is said to produce a greater abundance of butter from the same quantity of milk. In the Dutch method the milk is put into deep jars in a cool place, and each meal, or portion milked at one time, is kept separate. As soon as there is a slight appearance of acidity, the whole is churned in an upright churn, which, from the quantity of milk, is of very large dimensions. The plunger is worked by machinery moved by a horse, or sometimes by a dog walking in a wheel, which he turns by his weight. When the butter begins to form into small kernels, the contents of the churn are emptied on a sieve, which lets the buttermilk pass through. The butter is then formed into a mass, as described before.

It is an acknowledged fact, that such are the niceties of the dairy that great experience alone can insure a produce of superior quality, and this experience would be more readily acquired if the circumstances were accurately observed and noted. We would recommend to those who have extensive dairies, to mark by the thermometer the temperature of the milk and cream in the different stages of the process; occasionally to test the acidity of the buttermilk by means of alkalis; and to note any peculiarity in the atmosphere by an electrometer. A few observations, carefully noted, repeated, and compared, would throw more light on the true causes which favor or oppose the production of good butter, than all the guesses that have hitherto been made.

The quality of the butter depends materially on the nature of the pasture. The best is made from cows fed in rich natural meadows. Certain plants, which grow in poor and marshy soils, give a disagreeable taste to the butter. The common notion that the yellow flower called the buttercup gives color and flavor to butter is a mistake; cows never crop the flower if they can avoid it, and the whole plant is acrid and unpalatable. When cows are fed with cut grass in the stable, the butter is inferior, except in the case of some artificial grasses, such as lucern. Turnips and other roots given to cows in winter communicate more or less of a bad taste to butter, which is corrected in some degree by means of a small quantity of water and saltpetre added to the milk; and also, it is said, by giving salt to the cows with their food. But there is no butter made in winter equal to that which is made when the cows are fed entirely with good meadow hay, especially of the second crop, called after-math hay, which contains few seed stalks.

The yellow color of May butter is frequently imitated artificially, by mixing some ground anatto root, or the juice of carrots, with the cream. This is easily detected by the taste of the butter, which is not improved by it, and has not the peculiar flavor of fine grass butter; but in other respects it is a harmless addition. Some cows give a much yellower cream than others, especially the Alderney cows; and the butter made from it is of a peculiarly fine flavor. When a cow has lately calved, the milk is also much yellower, but this soon goes off, if it be not the natural color; and the butter made by mixing this with other milk, although of a deeper color, is not improved by it.

According to the accounts of the produce of butter from different countries and various breeds of cows, we may state that, on an average, four gallons of milk produce sixteen ounces of butter; and to make the feeding of cows for the dairy a profitable employment, a good cow should produce six pounds of butter per week in summer, and half that quantity in winter, allowing from six weeks to two months for her being dry before calving; that is one hundred and twenty pounds in twenty weeks after calving, and eighty pounds in the remainder of the time till she goes dry—in all, about two hundred pounds in the year. If she produces more, she may be considered as a superior cow; if less, she is below par.

The quality of the butter produced in England and in Holland is considered the best. A considerable quantity of Dutch butter is exported, but all that is produced in England is consumed at home, in addition to large quantities imported from Ireland and the continent of Europe. The quantity imported has been for some time progressively increasing.

Premium Butter-Making.—The following, read at the last meeting of the American Institute Farmers' Club, details the practice of one of the best butter-makers in the State of New York, Mr. Jesse Carpenter, of Elmira, in that state. It was communicated by Mr. H. E. Lowman. We invite the special attention of all our dairy readers to the views here propounded, as they come from a source entitling them to the highest confidence. Mr. Carpenter has long been known in the butter-making region, and in the market, as one of the most intelligent and successful dairymen and farmers in the county, and as a manufacturer of the veritable "*Orange county butter*:"

"The basis for a good and profitable butter-dairy is, a stock fulfilling as nearly as practicable all those constitutional and structural conditions which combine in the animal high milking qualities, with good size, robust health, and longevity. The next step is a prompt and thorough practice of the best method of treatment of the same by which the largest yield of the best quality of milk is secured. The next and best step in the achievement of a first-class dairy of butter is the application to its manufacture of an intimate and critical knowledge of the true process—from the expressing of the milk to the final touch the butter receives preparatory to the transit of the package to market.

"How to take the first step? *i. e.*, lay in the stock, or near it, Mr. Carpenter thinks can be known much more satisfactorily by reference to and study of popular authorities on the subject—writers who have made the rearing of stock with that view a speciality, and yet it is practical, common sense, and close and accurate observation which must be the main dependence at last. The next branch of inquiry, which is none the less important, is not so easily pursued to satisfactory results by an appeal to the same sources of information. Long and close experience has confirmed Mr. Carpenter in the accuracy of the following system or mode of treatment: the best summer food for the dairy stock, that which yields the largest quantity and best quality of milk, is a mixture of the finer grasses, such as red and white clover, timothy, and blue grass, all of which thrive well in desirable combination in the pasture fields of the Chemung Valley. All coarse, rank, and strongly-flavored weeds, of whatever description, must be banished from the feeding range of the dairy stock, otherwise butter of the finest quality cannot be made. Neither should they be fed during the milking season on any description of roots or coarse pungent vegetables, such as cabbage, if the butter is to be packed in firkins or any other vessel with the purpose of keeping.

"Even pumpkins are not desirable, though they may be used without material detriment. In the spring the season roots are most commonly used and advised. A small allowance of grain is much more beneficial. It accomplishes just what is needed, without contributing to undesirable results. It gives additional strength of muscle—the main thing desired—while, if judiciously given, it does not materially increase the deposit of fat. It also increases the quantity, and improves the quality of the milk, while roots and vegetables increase the quantity, but rather deteriorate the quality.

"During the milking season the cows must be moved from the pasture-field with great caution to prevent overheat of the system. That cannot take place in any degree without the milk being unfavorably affected in a corresponding ratio. And when they are in the heat of the sexual or copulating fever, the milk should not be used in the dairy, or with that from which butter for packing is to be made. For at such periods nature has provided for a medical interruption of the secretion of the animal, and the milk is greatly reduced in quantity, and in like measure improved in quality. Indeed the abnormal heat produced in the udder is of itself sufficient cause for rejecting the milk for butter-making. In the fall, where the grass begins to fail, and loses its nutritive or milk-producing elements, there is nothing that can equal corn-stalks as a substitute. The corn should be sown for the purpose.

"During the winter months the stock should be stabled or otherwise sheltered from the severities of the weather for the night, and while they feed. And the care, and amount and kind of food must be so appointed that they rather improve in condition and vigor than otherwise; at least they must not be allowed to run down to poor flesh and weakness; for then no amount of attention and good nursing through the summer will restore them to full milking capacities. The loss is irreparable for the season.

"A very thorough and practical understanding of the next and last branches, *i. e.*, the treatment of the milk, and the process of butter making, is much more difficult to obtain, because the knowledge is much more difficult to impart. With all the rules that may be given, there must be superadded, as conditions for their successful application, the necessity for close and critical observation. For there are constantly arising circumstances to modify the most of such which may be laid down in a general system.

"For depositing the milk when strained, the tin pail of the capacity of about twelve quarts is preferable to any other kind of vessel. It is sufficiently large to fulfill all the requirements in that particular; while its superiority over the shallow pan—which is considerably used—is too palpable to admit of doubt. The following propositions in point, are sustained by facts, the application or pertinency of which, all who have ever made butter, or who have been in a dairy with their eyes open to the every day phenomena therein, will readily apprehend, viz.: that milk, in order to realize from it the largest quantity and best quality of butter, must stand in an atmosphere of a given temperature a specific length of time, in all cases, in order to perfect it for the churn; that natural or artificial causes, either accelerating or retarding the processes of change in its elements from that fixed standard, have their like certain results of deterioration, both in the quality and the quantity of the butter produced; that a given quantity of milk, with the greatest surface exposure to the action of the atmosphere, in a given temperature, will change more rapidly than a like quantity in a like temperature, with a less surface exposure. The facts in proof, it need scarcely be intimated, condemn the use of the shallow pan.

"Every dairy-woman has observed the effects of a close, muggy and humid atmosphere—such as often precedes rain-storms in the summer—upon the milk; also, of a thunder-storm, also of only partly filling a vessel. In all cases named, the change in the milk is much more rapid than when the temperature of the atmosphere is even, and the equilibrium of its vital elements more perfectly sustained; and then in pails filled to their capacity. In all these instances too, the milk must be churned sooner But there is no method that will prevent a loss of product in quantity and quality.

"It is difficult to reach fully the truth of the first proposition. But we can approximate to it, and then adapt our practice as nearly to such standard or rule as it is possible to do. The temperature of the room where the milk is set must never exceed 65° F., and must be as steady and even as possible. The atmosphere of the same must be kept perfectly pure; for any odor peculiar to the decomposition of vegetable or organic substances mingling therewith, will inevitably leave its taint upon the milk and its product.

When the casein is precipitated or the milk coagulated, it is ready to churn. It must not stand until the second change takes place in the lacteal or the sugar of milk; that is, until the lactic acid becomes butyric acid, the latter stage of which may be known from the discolored spots of mould gathered on the surface of the cream. The thick milk should always be emptied with the cream into the churn. There are two important reasons in support of this method. First, the cream never all rises to the surface, and there must always remain with the coagulated part quite a fraction of the fatty matter, which is lost if not churned. Second, there is a virtue in the casein and lactic acid which is essential in the process of churning to import to the product the element of preservation. It is a fact which should be known by all dairy-men and dealers, that the product of cream exclusively, however skillfully manipulated, will not, if packed for keeping, preserve for any length of time the finer qualities of good butter.

"The milk in the churn, when fit for churning, should indicate 64° Fah., and should be agitated with a movement of the dash at not less than fifty strokes to the minute. Less motion will fail to divide properly the butter from the milk. When done, the butter should be taken from the churn and thrown into a tub or a small churn partly filled with water 42° to 44° Fah., and the buttermilk forced out with a small dash. It should then be put into trays and washed until the water used ceases to be the least discolored with buttermilk. It is then ready for salting, which should be done and the trays immediately carried to the cellar. The proper amount is 1¼ oz. to the pound of butter after working—*i. e.*, the butter should retain that amount when ready for packing. When it has stood three or four hours after the first salting, it should be stirred with a ladle and left in the form of a honey-comb, in order to give it the greatest possible surface exposure to the air, which gives color and fixes the high flavor.

"Butter when well manufactured, while standing preparatory to packing, is composed of granulated particles, between which are myriads of infinitesimal cells filled with brine, which is its life. At this period it should be touched with a light hand, as too much and too careless working will destroy its granular and cellular character, and reduce the whole to a compact and lifeless mass, with an immediate loss of flavor, and a certain and reliable prospect, if packed, of a rapid change of its character from indifferently good to miserably poor butter. It should never be worked in the tray while in a dry state, or all the ill results just alluded to will be realized. As a general rule, after the butter has stood in the trays twenty-four hours, and has been worked three or four times, as directed, it is ready for packing. After the firkin is filled, it should stand a short time, and then should be covered with a clean piece of muslin, and the whole covered with brine.

"It will not be out of place for the writer to state from his own knowledge, and upon his own responsibility, a few facts in connection with the above, referring solely to Mr. Carpenter's success as a dairyman. For the last twenty years, besides fattening the calves to the customary age of four weeks, he has averaged a fraction over two firkins to the cow per year. He has had butter stand in packages in his cellar for one year and a half, and open them with a flavor so fresh and sweet that the very best and most critical judges and buyers were deceived one year in its age—none even suspecting it to be the product of a former year. He never has, during that period, failed to reach in New-York market the highest figure representing the maximum market for Orange county butter; and latterly, he has very often overreached the very highest market half a cent to two and a half cents per lb."—*Tribune.*

Messrs. Charles R. Huntington & Co., produce commission merchants in New-York, give the following directions to their consignors for the shipment of butter to them, &c.

"The best butter is obtained at a temperature of fifty-one degrees, and the greatest quantity at a temperature of forty-six degrees, Fahr. During the process of churning the agitation will increase the heat to about five degrees more than it was when the cream was put into the churn. The operation of churning, whether it be of cream alone, or cream and milk, is performed in the same manner. The milk requires more time than cream to complete the process, from two to three hours being considered necessary; while cream alone may be effectually churned in an hour and a half. The operation should be slow in warm weather, for if done too hastily the butter will be soft and white. If the cream is at too high a temperature, the churn should be cooled with cold spring water, to reduce it to the proper degree of heat. In winter, again, the operation of churning should be done as quickly as possible, the action being regular, and the churn should be warmed to raise the temperature of the milk or cream. The air which is generated in the churn should be allowed to escape, or it will impede the progress by the froth which it creates.

"After the churning is performed, the butter should be washed in cold spring water, with a little salt in it, two or three times, to extract all the milk which may be lodging about the mass. The less milk which is in the butter, its quality is proportionably improved; after all the milk has been carefully extracted, the butter should be mixed with the finest ground rock-salt, in the proportion of five ounces to seven pounds. The butter and salt should be well mixed together with the hand or ladle. This superior salt for dairy purposes may always be obtained at the very lowest prices by addressing your orders to us.

"Firkins made of oak, with walnut hoops, to contain one hundred pounds of butter, net, are generally the most desirable; but many prefer Welsh tubs, either ash or oak. Packages should be made smooth, and should be got into market as bright and cleanly as possible. The demand is about equally divided between tubs and firkins.

"Butter, as it is received by merchants from small dairies, should be packed down solid, while it is fresh and sweet; and as there is usually a diversity of color, great pains should be taken to keep each shade by itself. To accomplish this, several packages may be filling at the same time, each one receiving its respective shade; so that when they are full, it will bore uniform in color upon the trier. A clean linen cloth, thoroughly saturated with strong brine, should be laid on the top, and a slight layer of moistened salt upon it. This not only preserves the butter, but gives to it a neat appearance.

"Nothing pleases commission merchants more than to receive a strictly fine dairy of butter—sweet, yellow, rosy to the smell, and delicious to the taste. It sells readily at a satisfactory price, and every body is pleased, from producer to consumer. Common and inferior butter *sticks*, notwithstanding its *greasiness*, at every stage, causing dissatisfaction and trouble from beginning to end. It is either over-salted, under-salted, colorless, milky, sticky, strong, rank or rancid, or all these combined—at any rate, it is not what it should be, and is consequently unsalable."

Cheese and Cheese Making.—In the making of cheese there are certain general principles which are essential, but slight variation in the process produces cheeses of very different qualities; and although the most important circumstance is the nature of the pasture on which the cows are fed, yet much depends on the mode in which the different stages of the fabrication are managed; and hence the great superiority of the cheeses of particular districts or dairies over those of others, without any apparent difference in the pasture. In those countries where the cows are chiefly kept tied up in stalls, and are fed with a variety of natural and artificial grasses, roots, and vegetables, superior cheese is often made.

The first process in making cheese is to separate the curd from the whey, which may be done by allowing the milk to become sour; but the cheese is inferior in quality, and it is difficult to stop the acid fermentation and prevent its running into the putrefactive. Various substances added to milk will soon separate the curd from the whey. All acids curdle milk. Muriatic acid is used with success for this purpose in Holland. Some vegetables contain acids which readily coagulate milk, such as the juice of the fig-tree, and the flowers of the Galium verum, or yellow lady's bed-straw, hence called *cheese-rennet*. Where better rennet cannot be procured, they may be substituted for the best curdler of milk, which is the gastric juice of the stomach of a sucking calf. This juice rapidly coagulates the milk as the calf sucks; and the only difficulty is in collecting and keeping it from putrefaction, which begins from the instant the stomach is taken from the calf. The preparation of the *rennet*, as it is called, is a most important part of the process of cheese-making. The following may be considered as the simplest, and perhaps the best. As soon as a sucking calf is killed, the stomach should be taken out, and if the calf has sucked lately, it is all the better. The outer skin should be well scraped, and all fat and useless membranes carefully removed. It is only the inner coat which must be preserved. The coagulated milk should be taken out and examined; and any substance besides curd found in it should be carefully removed. The serum left in it should be pressed out with a cloth. It should then be replaced in the stomach with a large quantity of the best salt. Some add a little alum and sal prunella; others put various herbs and spices, with a view of giving the cheese a peculiar flavor; but the plain simple salting is sufficient. The skins or vells, as they are called, are then put into a pan, and covered with a saturated solution of salt, in which they are soaked for some hours; but there must be no more liquor than will well moisten the vells. They are afterward hung up to dry, a piece of flat wood being put crosswise into each to stretch them out. They should be perfectly dried and look like parchment. In this state they may be kept in a dry place for any length of time, and are always ready for use. In some places, at the time of making cheese, a piece of vell is cut off, and soaked for some hours in water or whey, and the whole is added to the warm milk. In other places, pieces of vell are put into a linen bag, and soaked in warm water, until the water has acquired sufficient strength, which is proved by trying a portion of it in warm milk. The method employed in Switzerland is as follows:—a dry vell is taken and examined; it is scraped with a knife, and where any veins or pieces of tough membrane appear, they are removed. The whole surface is examined and washed carefully, if any dust or dirt has adhered to it; but otherwise it is only wiped with a cloth. A handful of salt is then put into it, and the edges of the vell are folded over and secured with a wooden skewer stuck through it. In this state it forms a ball of about three inches diameter, and is laid to soak twenty-four hours in a dish containing about a quart of clear whey, which has been boiled, and all the curd taken out. The next day the vell is well squeezed, and put into fresh whey; the first infusion being put into a proper vessel, the second is afterward mixed with it, and bottled for use. Half a pint of this liquor, of a proper strength, is sufficient to curdle forty gallons of milk. Experience alone enables the dairyman to judge of the strength of his rennet; for this purpose he takes in a flat ladle some milk which has been heated to about ninety-five degrees of Fahr., and adds a small measure of rennet. By the rapidity with which it curdles, and by the form of the flakes produced, he knows its exact strength, and puts more or less into the caldron in which the milk is heated for curdling.

There are different kinds of cheese, according to the mode of preparing it: soft and rich cheeses are not intended to be kept long; hard and dry cheeses are adapted to be kept and stored for provisions. Of the first kind are all cream cheeses, and those soft cheeses, called Bath cheeses and Yorkshire cheeses, which are sold as soon as made, and if kept too long become soft and putrid. Stilton and Gruyère cheeses are intermediate; Parmesan, Dutch, Cheshire, Gloucestershire, and similar cheeses, are intended for longer keeping. The poorer the cheese is, the longer it will keep; and all cheese that is well cleared from whey, and sufficiently salted, will keep for years. The small Dutch cheeses, called Edam cheeses, are admirably adapted for keeping, and form an important article in the victualing of ships.

The Gruyère and Parmesan cheeses only differ in the nature of the milk, and in the degree of heat given to the curd in different parts of the process. Gruyère cheese is entirely made from new milk, and Parmesan from skimmed milk. In the first nothing is added to give flavor:

in the latter saffron gives both color and flavor; the process in both is exactly similar. A large caldron, in the shape of a bell, capable of holding from 60 to 120 gallons of milk, hangs from an iron crane over a hearth where a wood fire is made. The milk, having been strained, is put into this caldron, and heated to nearly blood-heat (95° to 100°). It is then turned off the fire, and some rennet, prepared as stated above, is intimately mixed with the warm milk by stirring it with the hand, in which is held a flat wooden skimming-dish, which is turned round in the milk while the hand and arm stir it. A cloth is then laid over the caldron, and in half an hour, more or less, the coagulum is formed. This is ascertained by pressing the skimming-dish on the surface, when the whey will appear on the part pressed. If it is longer than an hour in coagulating, the milk has been too cool, or the rennet not strong enough. When the curd is properly formed, it is cut horizontally in thin slices by the same skimming-ladle. Each slice, as it is taken off, is poured along the side of the caldron which is nearest to the operator; by this means every portion of the curd rises successively to the surface, and is sliced thin. The whole is then well stirred, and the caldron is replaced over the fire. A long staff, with a small knob of hard wood at the end, and which has smaller cross pieces or sticks passed through holes in it at right angles to each other near the end, is now used to stir and break the curd, and the heat is raised to about 135°, which is as hot as the arm can well bear, even when used to it. The caldron is again swung off the fire, and the curd is stirred with the staff, which is moved round with a regular rotatory motion, the knob running along the angle formed with the side by the bottom of the caldron, which is in the form of a bowl. After stirring in this manner nearly an hour, the curd is found divided into small dies about the size of a pea, which feel elastic and rather tough under the finger. Experience alone can teach the exact feel they should have. The whey, of which a portion is removed occasionally, now floats at top, and the curd is collected in the bottom by giving a very rapid rotatory motion to the contents of the caldron by means of the staff. A cloth is now introduced into the bottom, and all the curd collected over it; it is raised by the four corners, and laid on an instrument like a small ladder, which is placed across the mouth of the caldron. The whey runs out through the cloth, which is a common cheese-cloth, woven with wide interstices; and the curd in the cloth is placed in a shape or hoop, made of a slip of wood, four inches and a half wide, the two ends of which lie over each other, so that the diameter can be increased or lessened. A cord fixed to one end of the hoop is passed with a loop over hooks on the outer surface of the other end, and prevents the ring from opening more than is required. The curd is pressed into this ring with the hands, and the ends of the cloth are folded over it. A round board, two inches thick, and strengthened by cross pieces nailed on it, is placed over the curd, and the press let down upon it.

During the next six or eight weeks the cheeses are turned and wiped every day, and a small quantity of fine salt is sifted on the surface, and rubbed in with the hand until they will take no more. The cheese-room is always very cool, and little light is admitted. A free circulation of air is essential. The cheeses are in perfection in about six months, and will keep two years. A quantity of elastic fluid is disengaged in the ripening, and forms those round eyes which are a peculiar feature in these cheeses. The smaller and rounder the eyes, the better the cheese is reckoned. They should contain a clear salt liquor, which is called the tears; when these dry up, the cheese loses its flavor.

In Cheshire the making of cheese is carried on in great perfection, and the greatest pains are taken to extract every particle of whey. For this purpose, the curd is repeatedly broken and mixed, the cheeses are much pressed, and placed in wooden boxes, which have holes bored into them. Through these holes sharp skewers are stuck into the cheese in every direction, so that no particle of whey can remain in the curd. The elastic matter formed also escapes through these channels, and the whole cheese is a solid mass without holes, which in this cheese would be looked upon as a great defect. The salt is intimately mixed with the curd, and not merely rubbed on the outside. This checks internal fermentation, and prevents the formation of elastic matter.

Gloucester and Somersetshire cheeses are similarly made, with this difference, that the curd is not so often broken or the cheese skewered; and a portion of the cream is generally abstracted to make butter. After the curd has been separated from the whey, and is broken fine, warm water is poured over it, for the purpose of washing out any remaining whey, or perhaps to dissolve any portion of butter which may have separated before the rennet had coagulated the milk.

Stilton cheese is made by adding the cream of the preceding evening's milk to the morning's milking. The cream should be intimately incorporated with the new milk; great attention should be paid to the temperature of both, as much of the quality of the cheese depends on this part of the process. To make this cheese in perfection, as much depends on the management of the cheese after it is made as on the richness of the milk. Each dairy-woman has some peculiar method which she considers the best; and it is certain that there is the greatest difference between cheeses made in contiguous dairies. The rennet should be very pure and sweet. When the milk is coagulated, the whole curd is taken out, drained on a sieve, and very moderately pressed. It is then put into a shape in the form of a cylinder, eight or nine inches in diameter, the axis of which is longer than the diameter of the base. When it is sufficiently firm, a cloth or tape is wound round it to prevent its breaking, and it is set out on a shelf. It is occasionally powdered with flour, and plunged into hot water. This hardens the outer coat, and favors the internal fermentation which ripens it. Stilton cheese is generally preferred when a green mould appears in its texture. To accelerate this, pieces of a mouldy cheese are sometimes inserted into holes made for the purpose by the scoop, called a *taster*, and wine or ale is poured over for the same purpose; but the best cheeses do not require this, and are in perfection when the inside becomes soft like butter, without any appearance of mouldiness. In making very rich cheeses, the whey must be allowed to run off slowly, because, if it were forced rapidly, it might carry off a great portion of the fat of the cheese. This happens more or less in every mode of making cheese. To collect this superabundant butter, the whey is set in shallow pans, as is done with milk when butter is made; and an inferior kind of butter called whey-butter is made from the cream of fat skimmed off.

Cheeses are frequently colored—a practice which probably arose from the notion of making the cheese look richer; but now it deceives no one. Yet if some cheeses were not colored they would not be so marketable, owing to the association that subsists between the color and the quality of the cheese. The substance used for coloring is most commonly anatto. It is ground fine on a stone, and mixed with the milk at the time the rennet is put in. The juice of the orange carrot, and the flower of marigold, are also used for this purpose. Cheddar, a cheese made in Somersetshire, which is highly prized, Stilton, Derby, and some other cheeses, are never colored; Cheshire slightly; but Gloucester and North Wiltshire deeply. Foreign cheeses are only colored very slightly, if at all. The Dutch cheeses are made in a very similar manner to the Gloucester cheeses, but the milk is generally curdled by means of muriatic acid, or spirits of salt; and great care is taken to prevent fermentation, and to extract the whole of the whey. For this purpose the curd is repeatedly broken and pressed; and before it is made up into the round shape in which it is usually sold, the broken curd is well soaked in a strong solution of common salt in water. This diffuses the salt throughout the whole mass, and effectually checks fermentation. When the cheeses are finally pressed, all the whey which may remain is washed out with the brine; salt is likewise rubbed over the outside, and they are set to dry on shelves in a cool place. The flavor of the cheese is perhaps impaired by the stoppage of the fermentation; but it never heaves, and it acquires the valuable quality of keeping well even in warm climates. From the place where this cheese is commonly made, it is known by the name of Edam cheese. A finer cheese is made at Gouda and other places, by imitating the process in making Gruyère cheese; but this cheese is always full of small cavities, and will not keep so long as the Edam. The cheese most commonly met with in Holland is a large kind of skim-milk cheese, which is made very like Cheshire cheese. It grows hard and dry, and has not much flavor. To supply this defect, cummin seeds are mixed with the curd, which those who are accustomed to it consider a great improvement. On the whole, it is a better cheese than our Suffolk skim-milk cheese, and forms an important part of the provisions usually stored for a Dutch family. In France, the Roquefort cheese is compared to our Stilton, but is much inferior, although a good cheese. The little cheeses made from cream and folded in paper, called Neufchâtel cheeses, are imported from France as a delicacy. They can be easily imitated, being nothing more than cream thickened by heat, and pressed in a small mould. They undergo a rapid change, first becoming sour and then mellow, in which state they must be eaten.

The green Swiss cheese, commonly called *Schabzieger*, is produced in the Canton of Glarus. The curd is pressed in boxes, with holes to let the whey run out; and when a considerable quantity has been collected, and putrefaction begins, it is worked into a paste with a large proportion of a certain dried herb reduced to powder. This herb, called in the country dialect *Zieger kraut* (curd herb), is the *Melilotus officinalis*, which is very common in most countries, and has a peculiar aromatic flavor in the mountains of Switzerland. The paste thus produced is pressed into moulds of the shape of a common flower-pot, and the putrefaction being stopped by the aromatic herb, it dries into a solid mass, which keeps unchanged for any length of time. When used, it is rasped or scraped, and the powder, mixed with fresh butter, is spread upon bread. It is either much relished or much disliked, like all those substances which have a peculiar taste and smell.

When a cheese which has been much salted and kept very dry is washed several times in soft water, and then laid in a cloth moistened with wine or vinegar, it gradually loses its saltness, and from being hard and dry, becomes soft and mellow, provided it be a rich cheese. This simple method of improving cheese is worth knowing. It is generally practiced in Switzerland, where cheeses are kept stored for many years, and if they were not very salt and dry they would soon be the prey of worms and mites. A dry Stilton cheese may thus be much improved.

The Lactometer.—This instrument is designed to test the cream qualities of milk. Pour the milk into the tubes, and the cream, when risen, will show how rich the milk is. The depth of cream will be shown by the figures on the tubes. By the lactometer the difference in the quality of the milk of different cows may be readily ascertained.

The qualities of cream vary much in the different breeds, depending on the modes of management, as well as the food. Thus, in some experiments made, it required twelve quarts from a short-horn cow to produce one pound of butter—something like a day's supply of milk; while nine and a half quarts of an Ayrshire cow's would give the same quantity; but it is often very variable in the same animal at different periods, and different animals of the same breed will produce very different results both in cream and butter.

Profits of the Cow.—Our first illustration is from Mr. Thomas Tufts, of Le Roy, Genesee county, N. Y. On the 1st of November, 1838, he says: "I have a cow six years old last spring. On the 29th of May she brought a calf; and on the 27th of June I took from her at three milkings, morning, noon, and night, of one day, thirty-one and a half quarts of good rich measured milk, which was not more than an average for the whole month. The last week in July, I found that her milk failed a little, and being some trouble, I stopped milking her three times a a day. On the last day of July, at two milkings, twenty-four quarts; on the last day of August, twenty-one and a half quarts; on the last day of September, eighteen quarts; and on the 31st day of October, I took from her fifteen quarts. She had no feed but that of common pasture, in which, however, was plenty of good water and shade, from the first of June till the last of September, and lodged at night in the barn-yard. On the 1st of October she was turned into a mowing-field; and during the last week in that month was fed once a day on hay, and twice a day on ruta-baga tops."

In July, 1845, a writer in the *Agriculturist* says: "I have a cow that calved about the middle of January, and is now eleven years old. The calf I fattened in the following manner: the first week I gave it one teat; the second week, two; afterward, three. The calf was sold for nearly six dollars; and in the mean time, milk to the amount of $1.75. Since that time I have realized for milk sold between fourteen and fifteen dollars; making the profit of the cow thus far, the present year, nearly twenty-three dollars, besides what I used in my own family, consisting of eight persons." Dr. Woodward informed the editor of the same journal that he had a cow which, in the year 1844, gave one thousand and fifty gallons of milk, which, at four cents a quart, would amount to one hundred and sixty-eight dollars. He also had, on the Hospital Farm, Worcester, Massachusetts, several other cows nearly as good. And William Cushman, of New Braintree, in that state, says, July 14th, 1845: "I have a cow which has given, for ten days in June, from fifty-four and a half to sixty-three pounds of milk per day." She was one-fourth of the Durham breed.

Peter H. Schenck, formerly a merchant of New York, but having a country residence in Dutchess county, in October, 1843, says: "My cow Emma was nine years old last spring; and till the summer of 1842 I never kept her milk separate from that of three other cows I have. Then I made the experiment for one week, during which she gave eighteen quarts per day, and the milk made fifteen pounds of butter." On the 21st of the following May—that is, 1843—he renewed the experiment, and for the three weeks ensuing she made sixty-five and a half pounds of butter. On the 15th of June, that same year, the milk that came from her was churned by itself, and the butter weighed three pounds eight ounces. The next day her butter weighed three pounds four ounces.

In 1843, a gentleman in the neighborhood of Troy, New York, says: "George Vail, Esq., of that city, was the owner of two cows only, one a full-blooded Durham, seven or eight years old, and the other four years old, seven-eighths Durham. He kept an accurate account of their milk and butter for thirty days. The result was as follows: one hundred and eight pounds of butter, besides supplying a family of five persons with new milk and cream for ordinary family use, and nine quarts of new milk daily for a calf. The average weight of milk per day, from the oldest cow, was sixty-eight pounds, and from the other, sixty pounds, during the thirty days. In the same year, Judge Walbridge, of Ithaca, in that state, had a cow that gave in the seven days ending June 24th, three hundred and ninety-five pounds ten ounces of milk, being an average of fifty-six and a half pounds per day, or twenty-eight and a half quarts per day. She had made two pounds one ounce per day, when two quarts of the milk were taken for family use. And the Rev. William Wisner, in the same neighborhood, had a cow, that in May of the same year made forty-seven pounds of butter, and supplied two families with new milk daily, during the time."

Among the more recent statistics of the dairy, the two following are selected. The first is from the Exeter *News-Letter*, which says: "Mr. Abraham Rowe, of Kensington, N. H., has a cow he raised from an Eastern breed, six years old, from which was made, between the 20th of May and the 20th of October, 1849, one hundred and fifty-six pounds of butter, averaging over one pound a day from pasture feed only. It being his only cow, furnished his family with their cream and milk besides." The second is from the *Farmer and Mechanic*, which says: "The best cow now in the United States is probably owned near Geneva, N. Y., which through the month of June, 1849, gave forty-two quarts of milk per day; and for five days she gave forty-five quarts per day. The cow is half Durham and half of the native breed."

The *Somerset Messenger*, New Jersey, contains a communication from J. W. Van Arsdale, stating the profits of a half-blooded Durham cow owned by him, for ten months from the 1st of April, 1849, to the 1st of February following. He sold in that time to the retailer 3,022 quarts, at 2 and 2½ cents a quart, amounting to $70.51, besides reserving a sufficient quantity for the use of his family of eleven persons, and about two messes of milk twice a week for baking purposes. The 3,022 quarts were sold by the retailer at double the price he gave for it, that is, for $141.02. He calculates that this amount of milk would have made 302 pounds of butter, which, at 20 cents a pound, amounts to $60.40. The cow has not had extraordinary care—having had two quarts of oat and corn meal per day during the drought last summer, and three quarts last spring before grass and this winter. And a farmer in Essex county, in that state, realized during twelve months previous to February 1st, 1850, a net profit of $456.09 from three ordinary cows—animals of the common breed of the country—that in most other hands would not probably much more than have paid for their keeping. As it is, they have supplied the family with all their milk and cream, paid for their keeping in full, as appears by a minute daily account, and yielded the above-named profit of $456.09.

It is unnecessary to gather up more similar cases. Our agricultural journals are filled with them. Now, suppose a farmer resolve that he would keep no cow that did not hold out a good milker nine months in the year, and that did not give sixteen quarts of milk per day for two months after calving, twelve quarts per day for the next four months, six quarts per day for the next three months, and two quarts per day for the following month; such a cow would yield per annum 3,000 quarts of milk, which, at four cents a quart, would be $120. Considering the cases above given, is not this feasible? With such cows, what if it does cost five or ten dollars a year more to keep them than is ordinarily expended for the purpose? May not such cows be raised? No matter if they do cost fifty or sixty dollars each; they soon pay for themselves.

If the various modes of obtaining this object were resorted to at once throughout the country, there would be a vast improvement in a very short time. No young animal of promising appearance for milk would go to the butcher. More care would be taken of young stock. More young stock would be retained to insure a better selection for milk cows. Farmers would think more of the advantages of employing the improved breed. Heifers would be milked with great care and very thoroughly, to get them in the habit of holding out longer as milkers. If they once dry early, no care and keeping will afterward correct the fault. Heifers with the first calf, especially, should be well fed, and with some additional care, the last three months they are in milk, to make them hold out.

It is supposed that a milk cow of medium quality, in this part of the country, will give twelve quarts of milk for two months after calving seven quarts per day on grass for the next four months, four quarts pe. day for the following two months, and perhaps two quarts per day for one month more; making altogether 1,500 quarts in the year.*

THE SPAYING OF COWS.†—A land-owner in the United States, Mr. Winn, seems to have had the first practice in spaying cows. The object of the operation was to maintain in the cow, without interruption, a supply of the same quantity of milk that she gave at the time of spaying. Notwithstanding the favorable results that Mr. Winn claimed to have obtained, the operation remained almost unknown in France until a veterinary surgeon of Lausanne (a Swiss), M. Levrat, made known the experiments practiced by him, and their effects. The treatise of M. Levrat ends with the following conclusions:

"The effect of spaying seems to me to be, to cause a more abundant and constant secretion of milk, which possesses also superior qualities, whence the following advantages result to the proprietor:

"1. An increase of one third in the quantity of milk.

"2. The certainty of having almost constantly the same quantity of milk.

"3. Exemption from accidents which may happen during the period of heat, when the cows mount each other, or are covered by too large bulls.

"4. Exemption from the risk of accidents which sometimes accompany or follow gestation and calving.

"5. Ease in fatting cows, when their milk begins to dry up.

"6. In fine, spaying is the only means of preventing onerous expenses, occasioned by cows becoming '*taurelières*,' which is so frequently the case in some countries, that it is rare to see cows kept more than two or three years without getting in this state; as, for example, in the environs of Lausanne and Lavaux, where they are obliged for this reason to change all their cows every two or three years, which is quite ruinous."

M. Levrat confirmed, after a year's observations, this fact, that the quantity of milk was constantly kept the same after the time of spaying.

M. Régère, veterinary surgeon at Bordeaux, inserted in the *Recueil de Médécine Vétérinaire*, a series of facts upon the spaying of cows, that had been acted upon by various proprietors.

It appears from these facts, which he recounts with many details, and whose authenticity is fixed, that the spayed cows have given, without interruption, after the operation, a quantity of milk at least double the average of what they gave during the preceding years. "After the researches that I have made since I commenced all these experiments, to the present time," says M. Régère, "this calculation is very exact, and if the cows continue to give milk during their whole life, in like manner,

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* "Farmer's Evening Day-Book."

† Statement of M. P. A. Morin, Veterinary Surgeon at the Royal Depôt at Langonnet. Translated for the *Working Farmer*, from "*La Normandie Agricole Journal d'Agriculture Pratique.*"

the operation of spaying will furnish incontestable advantages, particularly in large cities, and their vicinity, where fodder is very dear, and where milk always sells well."

A remark made by MM. Levret and Régère is, that some cows, although they have been spayed, have had their heat, notwithstanding the removal of their ovarium, and the incapacity for their reproduction. These animals present, at the time of their heat, this difference from what we remark during the same period in cows not spayed, that their milk does not undergo any alteration in either quantity or quality.

We may add, that the school of Alfort has, recently, practiced this operation upon different cows, and that all the results obtained have reached the point we have above stated.

Leaving this, we arrive at the facts determined by M. Morin:

"Young cows ought to receive that nourishment which favors the secretion of milk, and which in consequence renders active their lactiferous vessels. The cow is not usually in full production until after the third or fourth calf; she continues to give the same return up to the seventh or eighth; from this time lactation diminishes after each new calving. On the other hand, from the moment that the cow has received the bull, and gradually as gestation advances, the quantity of milk progressively diminishes in most breeds, until three or four months before healthy parturition, the secretion of milk is almost nothing. It is to guard against this loss, and other inconveniences, that we lay down what we have obtained after some years' experience in spaying the cow, and the happy results that we meet with daily.

"**Of the Spaying of the Cow, and the Advantages of this Operation.**—The operation of spaying in the cow is productive of great advantages.

"1. The cow spayed a short time after calving, that is to say, thirty or forty days afterward, and at the time when she gives the largest quantity of milk, continues to give the like quantity, if not during her whole lifetime, at least during many years, and at the time when the milk begins to dry up the animal fattens. We are able to add, moreover, at this day, certain facts, the result of many years' experiment, that the milk of the spayed cow, although as abundant, and sometimes more so, than before the operation, is of a superior quality to that from a cow not spayed; that it is uniform in its character, that it is richer, consequently more buttery, and that the butter is always of a golden color.

"We believe that we ought to remark in passing, that if we feed the spayed cow too abundantly, lactation diminishes, and that the beast promptly fattens. It is therefore important that the feeding should not be more than sufficient to enable us to obtain the desired result.

"2. The spayed cow fattens more easily; its flesh, age considered, is better than that of the ox; it is more tender and more juicy.

"Indeed, no one is ignorant of the fact that all domestic animals, females as well as males, deprived of their procreative organs, fatten more quickly than those which retain them; that the flesh of the spayed females is more tender and more delicate than that of males. The same phenomena take place among spayed cows that occur among other females that have submitted to this operation; so, besides the advantage of furnishing a long-continued supply, before commencing a course of fattening, of abundant milk, and butter of a superior quality, the cow fattens easily and completely, and a certain benefit follows this course.

"3. In spaying decrepit cows, that is to say, of the age of from six to seven years, puny, small ones; those which, though fine in appearance, bear badly; those which are subject to miscarriage; those which frequently experience difficult calving, or delivery; those difficult to keep; and finally, all those that are *taurelières*—that is to say, constantly in heat—we have, in addition to an abundant production of milk and butter, and a facility of fattening, the advantage of preventing a degeneration of the species, and, moreover, of avoiding a crowd of accidents or maladies which frequently take place during or after gestation, and of diminishing those which happen during the period of heat, such as that of heavy cows mounting others, or being jumped upon by too heavy bulls.

"Except under peculiar circumstances, we should take care in spaying the cow that its teats have acquired their complete development, and that the milk has the proper qualities. The most suitable time is after the third or fourth calving.

"Many societies of agriculture, impressed with the important results that this operation effects, fix yearly at their agricultural meetings premiums for the encouragement of the spaying of old cows. We doubt not that other societies—who have not yet adopted this plan, not being convinced of its importance, when they are—will imitate their example. By this means they bestow upon the country a new source of products.

"We have been engaged for four years in researches upon this valuable discovery; we believe that it is incumbent upon us to state the results that we have obtained up to the present time. In the number of twenty-seven cows, aged from six to fifteen years, that we have actually spayed, we have had the following results: 1. Increase of milk in cows of six years; 2. Constant production in those that have passed that age; 3. Milk richer than that of the cow not spayed, consequently more buttery, and the butter both of a uniformly golden color, and having an aroma and taste far superior to that of a cow that has not undergone this operation.

"Early in July, 1842, we obtained, as a subject of experiment, a cow from Brittany, of the small kind, twelve years old, calved about two months before, and which gave, when we obtained her, about six quarts of milk daily. The next day after we performed the operation of spaying—indeed the first eight days after that—the secretion of milk sensibly diminished, in consequence of the light diet on which she had been put, but, on the ninth day, the time at which the cure was complete and the cow put on her ordinary food, the milk promptly returned, as to its former quantity, and she at the same time assumed a plumpness that she had not had previously. Customarily bringing together the yield of three days for butter-making, being eighteen quarts, it produced constantly two kilograms of butter of the best quality. From the month of December to the following March, the quantity of milk diminished about one-third, and the butter proportionally, the cow during that time having been put on dry fodder. But so soon as we were able to turn her into pasture—about the beginning of April—the milk, after eight days of this new food, resumed its former course, and the animal continued daily to furnish the same relative amounts of milk and butter as before.

"Three cows, two of which were fourteen years old, and the other fifteen, have dried up two years after the operation, and at the same time promptly fattened, without increase or change of food.

"One cow, eight years old, plentifully supplied with trefoil and cabbage, gave, a short time after the operation, a quantity of milk nearly double that which she gave before, although she was kept on the same kind of food. She has during a year continued to furnish the same amount, and has, in addition, fattened so rapidly, that the owner has been obliged, seeing her fatness, to sell her to the butcher, although she was still very good for milk.

"Another fact, no less worthy of remark, we must not pass over in silence; and which goes to prove the superior and unchanging quality of the milk of a spayed cow. It is, that a proprietor having spayed a cow five years old, recently calved, with the special intention of feeding with her milk a newly-born infant, the infant, on arriving at the age of six months, of a robust constitution, refused its pap when it was once accidentally prepared with milk different from that of the spayed cow.

"The other cows which had been spayed continued to give entire satisfaction to their owners, as well in respect to the quantity and quality of the milk, as also by their good condition.

"Six cows manifested, shortly after the operation, and on divers occasions, the desire for copulation; but we have not remarked this peculiarity except among the younger ones. In other respects, as my colleagues MM. Levrat and Régère have stated, the milk has not indicated the least alteration in quantity or quality.

"Indeed, the happy results that are daily attained from this important discovery are so conclusive, and so well known at this time in our part of the country, that, as we write, many proprietors bring us constantly good milch cows, since we have called upon them to do so, for us to practice the operation of spaying upon them. Every owner of cattle is aware that, from the time that the cow has received a bull, and in proportion as gestation advances, the milk changes and diminishes progressively, until at last, two or three months before a healthy parturition, the animal gives very little or no milk, whence ensues considerable loss; while at the same time, after the cows are subjected to the bull, the milk and butter are, for fifty days at least, of a bad quality, and improper to be exposed for sale; but, in addition to this, breeding cows are generally subjected to such loss in winter, and their keepers find themselves during a great part of the year entirely deprived of milk and butter, and at a time, too, when they most need them.

"By causing the cows to undergo this operation, as we have mentioned in the preceding remarks, the owner will never fail of having milk and butter of excellent quality; will fatten his animals easily when they dry up, and also will improve the race, an anxiety for which is perceived in many provinces of France.

"In general, the means employed by farmers to obtain the best possible price for old cows, beyond being useful, or, to use a commercial term, not merchantable, is to bring them to the bull, intending that gestation shall give them more suitable plumpness, so that they may be sold on more advantageous terms to the butcher; but does this state of fictitious *embonpoint* or fatness, render the flesh of these beasts better? Assuredly not. It is merely bloated, flabby flesh, livid, and which easily taints. Broth made from it is not rich, is without flavor, and without an agreeable smell; the lean and fat are in a measure infiltrated with water, and are consequently of bad quality and very difficult sale. These causes ought then to determine farmers to adopt the advice we give: they, as well as the butcher and the consumer, will derive very great advantage from it.

"As our method of operating may be slightly different from that pointed out by our colleague, M. Levrat, we will describe that which we practice.

"Having covered the eyes of the cow to be operated upon, we place her against a wall provided with five rings firmly fastened, and placed as follows: the first corresponds to the top of the withers; the second to the lower anterior part of the breast; the third is placed a little distance from the angle of the shoulder; the fourth is opposite to the anterior and superior part of the lower region, and the fifth, which is behind, answers to the under part of the buttocks. We place a strong assistant between the wall and the head of the animal, who firmly holds the left horn in his left hand, and with his right, the muzzle, which he elevates a little. This done, we pass through and fasten the end of a long and strong plaited cord in the ring which corresponds to the lower part of the breast; we bring the free end of the cord along the left flank, and pass it through the ring which is below and in front of the withers; we bring it down along the breast behind the shoulders and the angle of the fore-leg to pass it through the third ring; from there, we pass it through the ring which is at the top of the back; then it must be passed around against the outer angle of the left hip, and we fasten it, after having drawn it tightly to the posterior ring by a simple bow-knot.

"The cow being firmly fixed to the wall, we place a cord, fastened by a slip-noose around its hocks, to keep them together in such manner that the animal cannot kick the operator; the free end of the cord and the tail are held by an assistant. The cow, thus secured, cannot, during the operation, move forward, nor lie down, and the veterinary surgeon has all the ease desirable, and is protected from accident.

"M. Levrat advises that an assistant should hold a plank or bar of wood obliquely under the teats and before its limbs to ward off the kicks; but this method is not always without danger, both to the operator and the animal, because, at the commencement, that is, when the surgeon makes the incision through the hide and the muscles, the cow makes such sudden movements, and tries so frequently to strike with its left hind foot, that it may happen that upon every movement, the plank or the bar may be struck against the operator's legs. On the other hand, although the defense may be firmly held by the assistant, yet it may happen that, in spite of his exertions, he sometimes may be thrown against the operator by the movements she may attempt, and there may be an uncontrollable displacement of the plank or bar; and then it may happen that she becomes wounded, and at the same time prevents the operation, while, by the mode we point out, there is no fear of accident, either to the operator or the beast. In case of the want of a wall provided with rings, we may use a strong palisade, a solid fence, or two trees a suitable distance apart, across which we fix two strong bars of wood, separated from each other according to the size of the cow.

"There is another means of confining them that we have employed for some time past, where the cows were very strong and irritable, more simple than the preceding, less fatiguing for the animal, less troublesome to the operator, and which answers perfectly. It consists: *First.* In leaving the cow almost free, covering her eyes, holding her head by two strong assistants, one of whom seizes the nose with his hand and strongly pinches the nostrils, whenever the animal makes any violent movements during the operation. *Second.* To cause another assistant to hold the two hind legs, kept together by means of a cord passed above and beneath the hocks; this assistant also holds the tail and pulls it, whenever the animal seeks to change its place.

"The cow being conveniently disposed, and the instruments and appliances, such as curved scissors, upon a table, a convex-edged bistoury, a straight one, and one buttoned at the point, a suture needle filled with double thread of desired length, pledgets of lint of appropriate size and length, a mass of tow (in pledgets) being collected in a shallow basket, held by an intelligent assistant, we place ourselves opposite to the left flank, our back turned a little toward the head of the animal; we cut off the hair which covers the hide in the middle of the flanks, at an equal distance between the back and the hip, for the space of thirteen or fourteen centimetres in circumference; this done, we take the convex bistoury, and place it opened between our teeth, the edge out, the joint to the left; then, with both hands, we seize the hide in the middle of the flank and form of it a wrinkle of the requisite elevation, and running lengthwise of the body. We then direct an assistant to seize with his right hand the right side of this wrinkle; we then take the bistoury that we held in our teeth, and we cut the wrinkle at one stroke through the middle; the wrinkle having been suffered to go down, a separation of the hide is presented of sufficient length to enable us to introduce the hand; thereupon we separate the edges of the hide with the thumb and forefinger of the left hand, and in like manner, we cut through the abdominal muscles, the *iliax* (slightly obliquely) and the *lumbar* (across) for the distance of a centimetre from the lower extremity of the incision made in the hide; this done, armed with the straight bistoury, we make a puncture of the peritoneum at the upper extremity of the wound; we then introduce the buttoned bistoury, and move it obliquely from above to the lower part up to the termination of the incision made in the abdominal muscles. The flank being opened, we introduce the right hand into the abdomen and direct it along the right side of the cavity of the pelvis, behind the *cul de saurumen* (paunch) and underneath the rectum, where we find the *cornes de l'uterus* (matrix); after we have ascertained the position of these viscera, we search for the *ovaries* (organs of reproduction), which are at the extremity of the *cornes*, and when we have found them, we seize them between the thumb and forefinger, detach them completely from the ligaments that keep them in their place, pull lightly, separating the cord, and the vessels (uterine or fallopian tube) at their place of union with the ovarium, by means of the nail of the thumb of the forefinger, which presents itself at the point of touch; in fact, we break the cord and bring away the ovarium. We then introduce again the hand into the abdominal cavity, and we proceed in the same manner to extract the other ovaria. This operation terminated, we, by the assistance of the needle, place a suture of three or four double threads waxed at an equal distance, and at two centimetres or a little less, from the lips of the wound; passing it through the divided tissues, we move from the left hand with the piece of thread; having reached that point, we fasten with a double knot, we place the seam in the intervals of the thread from the right, and as we approach the lips of the wound, we fasten by a simple knot, with a bow, being careful not to close too tightly the lower part of the seam, so that the suppuration which may be established in the wound, may be able to escape. This operation effected, we cover up the wound with a pledget of lint kept in its place by three or four threads passed through the stitches, and all is completed, and the cow is then led back to the stable.

"It happens, sometimes, that in cutting the muscles, of which we have before spoken, we cut one or two of the arteries, which bleed so much that there is necessity for a ligature before opening the peritoneal sac, because, if this precaution be omitted, blood will escape into the abdomen, and may occasion the most serious consequences.

"**Care After the Operation.**—The regimen we prescribe during the first eight days following the operation, is a light diet, and a soothing lukewarm draught; if the weather should be cold, we cover the cow with a woolen covering. We must prevent the animal from licking the wound and from rubbing it against other bodies. The third day after the operation, we bathe morning and evening about the wound, with water of mallows, lukewarm, and in default of this, we anoint it with a salve of hogs' lard, and we administer an emollient glyster during three or four days.

"Eight days after the operation we take away the bandage, the lint, the fastenings and the threads; the wound is at that time completely cicatrized, as we have observed that a reunion takes place almost always by the first intention, as we have only observed suppuration in three cows, and then it was very slight. In this case we must use a slight pressure above the part where the suppuration is established, so as to cause the pus to leave it, and if it continues more than five or six days, we must supply emollients by alcoholized water, or chloridized, especially if it be in summer. We then bring the cow gradually back to her ordinary nourishment.

"We have remarked in some cows a swelling of the body a short time after being spayed, a state that we have attributed to the intro duction of cold air into the abdomen during the operation; but this derangement has generally ceased within twenty-four hours. If the contrary should occur, we administer one or two sudorific draughts; such as wine, warm cider, or half a glass of brandy, in a quart of warm water; treatment which suffices in a short time to re-establish a healthy state of the belly, the animal at the same time being protected by two coverings of wool.

"The operation which we have been describing, ought to be performed as we have said before, thirty to forty days after calving, upon a cow which has had her third or fourth calf, so that we may have a greater abundance of milk. The only precaution to be observed before the operation, is, that on the preceding evening we should not give so copious a meal as usual, and to operate in the morning before the animal has fed, so that the operator shall not find any obstacle from the primary digestive organs, especially the paunch, which, during its state of ordinary fullness, might prevent operating with facility.

"**Conclusion.**—From what has preceded, it is fixed and irrefutable—1. That spaying induces permanency of milk, increase of quantity, and improvement of quality; richer, more buttery, superior color, finer taste and flavor. 2. The most suitable age is six years, and after the third or fourth calf. 3. The spayed cow fattens more easily, and furnishes beef of a better quality. 4. Cows that are bad breeders may be kept as good milkers, and the quality of good cattle kept up."

DISEASES AND REMEDIES.—This is perhaps the most unsatisfactory division on which a writer on cattle can pretend to write. There are more cattle destroyed than cured by the strange quackery and drenching pursued by their over-officious owners; and to write any thing to encourage a system so ruinous is to perpetuate the evil. The first thing a dairyman or grazier does is to get a long list of "receipts" inserted in a book, classified or not, but all under the names of certain diseases. A cow falls ill. She has the yellows, or the staggers, or the worms, not because there are any clear and decided symptoms, but because the owner fancies it is so, and his specific is administered. He watches intently, and no good effect is produced; he runs for another medicine prescribed by another hand; the one opposing, and perhaps counteracting the other. One neighbor looks in, and perhaps another; each advises a medicine, as empirical as that of the owner, and all must be given, until the symptoms increase and get so bad that the village quack is sent for, who is more clever than the rest, because he has a larger range of "receipts," and he adds his quota of drugs, until the beast dies, poisoned by medicine!

Now, so long as unprofessional men will continue to prescribe and treat obstinate and complicated complaints; and so long as the public press will pander to the receipt-mania, there is no hope of any amendment. Certainly we shall lend no aid to the system.

But there are some simple and manifest ailments where the farmer may himself administer simple medicines; and there are some cases of emergency, too, when it may be necessary to do something, till scientific aid can be obtained. To these cases we will allude. We will take the complaints in the order of their frequency.

Felon.—This is a complaint common to all kinds of cattle. It proceeds from cold and exposure, and is accompanied by low fever. The beast is more or less off his food. His coat is staring, his eye dull, his nose dry, his *back sore*, he will flinch from the touch, and his teeth feel loose. It is an attack of felon. He requires rousing by cordials. Let him be housed and given a drink: one ounce of turmeric, one ounce of fenugreek, one ounce of liquorice, one ounce of aniseed powder, in a quart of ale; and he will generally recover; if not, repeat the dose. A very common and a very safe process is also to divide the nerve of the under side of the tail. This relieves the back, and is thus performed: Feel for a soft place in the under side of the tail. The knobs are the joints, the soft place is the bone. Cut the skin across at the soft part, and it will bleed for eight or ten minutes. Tie up the tail with a piece of linen cloth, and great relief will be afforded. This is not mentioned in any work we ever met with, but we have seen its efficacy in hundreds of instances.

Hoven, Blown, or "Over Full."—Sometimes a change of food, or a feed of wet clover or potatoes, greedily eaten, will induce fermentation in the stomach instead of digestion. The sides will be blown up, until the stomach presses on the skin, with a force which renders it hard to the fingers. For this the probang is by far the best remedy. Introduce this into the stomach by the throat, and the foul air will immediately escape. This instrument is not always at hand, and the beast will lie down, and the disease may continue until the walls of the stomach are ruptured. In these cases an ounce of ammonia will often give relief. A pint of vinegar we have known to effect it; but the safest remedy is a *pint of linseed oil.* It lubricates the mouth of the stomach, and assists the air to escape by both the orifices, otherwise closed up. Gentle exercise will be useful; but all violence, and, above all, such horrid drenches as tar and salt, with the idea of making them eject their saliva, can only do harm. It is sometimes necessary to cut into the stomach, an operation a veterinary surgeon alone can perform.

Choking.—A beast will often get a turnip or potato fast in its throat, which will resist all efforts to get it either up or down; and, what is worse, when once this has taken place, the beast will always after be liable to the same accident. The mouth should first be carefully examined, to see that the turnip cannot be extracted with the hand; if it can be, this is the best mode by far for effecting its extraction. If not, the probang, invented by Dr. Munro, is absolutely necessary. Let a little sweet oil be first given to the animal, and then let the probang be carefully and cautiously put down, the cup end downward; if the turnip offers much resistance it must again be withdrawn, and by this its position may be changed. Generally it will go down, with a very slight effort, and sometimes it may be got up by running the thumbs up each side of the neck, and gently pressing with the hand.

Calving.—This, though not a disease, is rightly classed amongst them, because it is strictly a subject of medical and surgical treatment; and, though a natural operation, is always accompanied by more or less danger. In old cows, or cows after their first and second calves, if the right presentation takes place, the animal will generally calve without mechanical help. It often happens, that cows which calve unobserved, do the best, and we know a very careful and successful grazier who makes a point of never interfering in ordinary cases. There is certainly more danger from premature assistance than from delay. Usually the waters are the first symptoms of decided labor. A thin filmy bag first breaks, and after this the cow will sometimes eat, and seem comfortable for an hour. The second is larger and thicker, and envelops the feet of the calf. When the feet are there, or one begins to protrude, the other may be sought for, and when both are brought forward, mechanical assistance may safely be rendered, if the head is found between and above them. A cow-tie may be strung round each foot, and certainty of the head being between them is a signal for a slow and gentle pull, avoiding any thing like force, and the pulling being downward towards the udder. But above all things, *give time.* The muscles relax and give way for the calf, if proper time is allowed. When calving is over, follow the directions formerly given in regard to the management of the mother and produce,—the latter should suck, and the mother lick the calf.

False Presentations will sometimes take place ;—a single foot, or the head, or the hind legs. In either of these cases, the operator must wait for one of the throes being over, and then gently put back the calf, and introduce his hand, which has been previously oiled, and bring forward the legs which are wanting. If this cannot easily be done, a veterinary surgeon will be necessary. When the hind legs alone are presented, it is only necessary to proceed in the usual way. In cases of difficulty, of malformation in the mother, of water in the head, or monstrosity in the calf, it is always best to call in a veterinary surgeon.

Some parties have a practice of giving every cow a calving drink. We uniformly prefer, as we said, nature's medicine, the licking of the calf, to any and all others which can be given. If it has been a long and protracted labor, a drink of warm gruel will be useful. If the cow refuses to lick the calf, which heifers of their first calves will sometimes do, it is seldom necessary to do more than run the hand over the newly dropped calf, and then pass it across the mouth and lips of the mother.

Abortion is a habit with some individual cows, and is often the result of the presence of blood, or bad smells, arising from putrid matter decaying near the cow-houses or yards ; and once introduced into a cow-house, it often so affects the imaginations of the rest, as to become epidemic. Let the cow and the remains of the calf be instantly removed from the rest, and kept alone and quiet. Chloride of lime should be plentifully sprinkled near the stall where she was, and the whole of the herd should have their noses besmeared with tar.

Retention of the Placenta, or failing to cleanse, after calving, sometimes occurs ; and it requires great care to prevent its retention, when the expulsion does not take place in a few hours after calving. It indicates weakness, and want of tone in the uterus. A mild stimulant may be given—nothing better than an infusion of chamomile flowers, say two handfuls in a quart of water, added to a quart of good boiled ale, and if necessary, an injection of soap-suds, to keep open the bowels and prevent inflammatory action. If it resists all efforts, and begins to putrefy, it will be necessary to consult a veterinary surgeon.

Red Water.—This is a complaint which frequently attacks cows in summer; and, on some pastures, it is a regular occurrence. If taken in an early stage, a dose of eight ounces of Epsom salts, dissolved in a pint of water, will almost invariably set the beast right. If not at hand, a pound of common salt may be given, and the dose repeated, in case of need.

Quarter Felon.—Inflammatory fever, or quarter-ill, is one of the most obstinate diseases with which cattle can be afflicted; and, though odd instances of a cure have been reported, they are extremely few, unless the disease has been attacked in a very early stage. It is also highly contagious, and will sometimes go through an entire herd of calves before they are a year old, for it seldom occurs after that period. The calf gets off its food, and becomes lame and stiff in one foot. The foot may be examined, and no cause of lameness discovered, but soon the disease has become general; air bubbles are formed between the skin and muscles, and there is a cracking sensation to the hand on passing it over the skin, especially in the legs. Inflammatory fever is disorganizing the body.

Preventives, as the seton in the dewlap, bleeding, in autumn, doses of dyer's madder, etc., are favorite remedies. The seton can do no harm,—it may be tried; but no specific, either remedy or prevention, has yet been discovered.

Foul in the Foot.—This is a tiresome, worrying disease, to which large heavy milk cows are specially subject; and is to the cow what foot-rot is to the sheep. There is inflammatory action between the claws; it begins to discharge fetid matter, and is a source of pain and irritation, which often dries up the milk, and is often a painful and annoying complaint to cure. Let the foot first be well cleaned and fomented with warm water, and all loose flesh be cut or clipped off. The foot may then be poulticed for one night with flaxseed-meal poultice, and then again fomented and anointed with tar; and, if it should smell very offensively, a little charcoal, or a few drops of chloride of lime may be added to the water. Next day the inflammation will be relieved and brought out externally by the tar, and the foot may be then dressed with the butter of antimony (chloride of antimony) night and morning, and the tar applied afterward. The foot should be confined in a boot or stocking, and kept free from dirt. A little salts or linseed-oil should be given to keep the bowels in a state of gentle activity.

Milk Fever.—This is a common complaint with cows which are deep milkers, at least in summer. Prevention is all the farmer has to do with, for the cure, if any, must be left in the hands of the veterinary surgeon. He must, if he see the udder distended, milk the cow before calving regularly three times a day; she must be kept as cool and quiet as possible, and have mashes of bran only, for a few days after calving. This is cooling and somewhat laxative, and if the udder should be hard, which it should not be after this treatment, let it be rubbed with marsh mallow ointment. A gentle dose of purgative medicine may be given if the cow is in very high condition, and she should be driven a few miles every day before calving. With these precautions there is little danger at least of its being fatal.

The Yellows, or Jaundice.—This is easily distinguishable. White cattle are peculiarly subject to it, and it makes its firt appearance by a yellowness of the eyes and under the anus; the bowels become costive, the teeth loose,.the appetite gone, and rapid weakness sets in. Give 4 oz. common salt, half oz. Barbadoes aloes, 1 dr. ginger, 1 quart home-brewed ale, made into gruel.

Loss of Cud.—All ruminating animals are sometimes subject to this. The stomach, with a sort of convulsive action, throws the half masticated food back into the mouth to be rechewed, and sometimes this healthy contractile tone of the stomach is lost. Give—6 dr. Barbadoes aloes, 6 oz. common salt, 3 dr. ginger, 1 oz. alspice, in a quart of gruel.

Inflammation.—This is a disease known by coldness of the horns and extremities, generally accompanied by much acute and constant pain. All home attempts to cure this disorder will be impotent; a veterinary surgeon should be at once consulted. The same may be said of *staggers*, *strangury*, and a variety of acute disorders.

Pleuro-Pneumonia is only mentioned to say that nothing like a specific has, so far, been discovered. The fearful medicine of a gill of spirits of turpentine and a gill of spirits of sweet nitre seems to be the most successful but desperate remedy. If the animal is fat, there is scarcely a chance of recovery. If the animal is lean, remedial measures may be tried, but they are more likely to fail than be successful.

The Epidemic, or Sore Mouth and Feet,—for so a disease which affects the mouth with blisters and the feet with pain and inflammation, is best known, has lost much of the virulence it possessed from 1839 to 1844, but still is sometimes troublesome. A dose of Glauber or Epsom salts, in the first stage, with shelter and bran mashes, will generally prevent evil consequences. Should the foot break out, the same treatment will be useful that we advised in the foul of the foot.

Diseases of Calves.—If well managed, calves are subject to few diseases; and if starved, neglected, or ill managed, they will be scarcely kept alive by medicine. The most fatal disease is the *scour* or *diarrhœa.* As it usually proceeds from some foreign, often acrid matter, in the bowels, a tablespoonful of sulphur in the milk will generally remove it in due time. If it should continue after this, give a teaspoonful of laudanum and a tablespoonful of tincture of rhubarb. We once had a calf nearly dead of diarrhœa; medicine seemed to have no impression upon the obstinate attack. It was dying. We gave it a bottle of port wine, expecting it would be dead in the morning. In the morning, however, it was well and crying for its breakfast. A pint of good old port will often work wonders when all other remedies have failed, both in man and beast.

Costiveness is sometimes a disease in calves, as well as the opposite extreme. Here it is undesirable to give medicine, unless it be very severe. A handful of onions, boiled with an ounce of fat bacon, is by far the best remedy, and it never does injury, but is nutritious to the animal even if well.

Gripes is a complaint to which young calves are subject, which have had sour milk given to them; and there is often acute pain exhibited, kicking of the belly with the hind legs, pawing, etc. A cure is gener ally effected, in a remarkably short time, by a cupful of peppermint water and a teaspoonful of laudanum.

The great secret of keeping all animals is to tend them carefully and keep them well. Let the land said to be subject to disease be well drained and better farmed; let the bad herbage and cold beds of the cattle be cured and they will be healthier and thrive better. It is better always to pay the cake-crusher or the miller, than to pay the veterinary surgeon, however skillful he may be.

In conclusion, treat the cow well, and she will be grateful. Let all your proceedings be dictated by humanity and kindness, and a more patient and grateful servant you cannot have.

THE

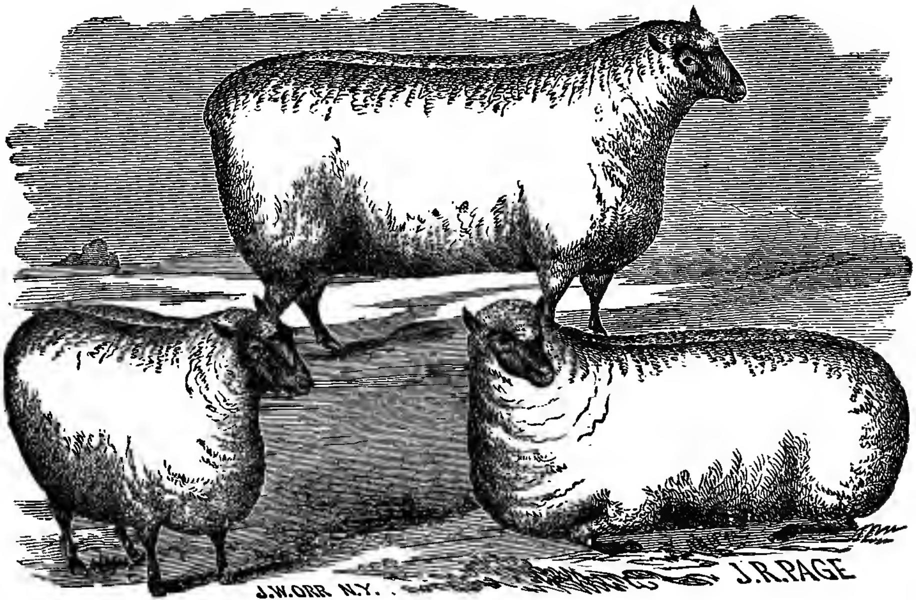
DOMESTIC SHEEP:

THEIR

BREEDS, MANAGEMENT,

AND

DISEASES.



SOUTH-DOWN SHEEP

THE DOMESTIC SHEEP:

THEIR BREEDS, MANAGEMENT, ETC.

BREEDS OF SHEEP IN THE UNITED STATES.—The principal breeds of sheep in the United States are the *Native sheep*, the *Spanish* and *Saxon Merinos*, the *New Leicester*, or *Bakewell*, the *South-Down*, the *Cotswold*, the *Cheviot* and the *Lincoln*.

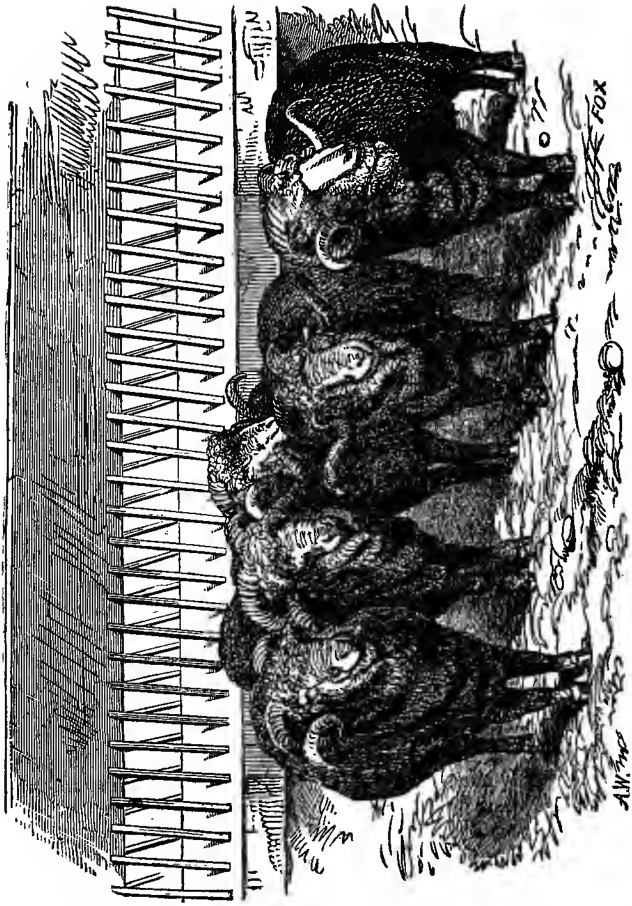
The Native Sheep are the variously mixed descendants of those originally introduced by the first colonists. They yielded wool suited only to the coarsest fabrics. They were slow in arriving at maturity, compared with the improved English breeds; and the weight of fleece, and quality and quantity of mutton, were inferior to the improved English breeds. They have now, however, become nearly extinct, by crosses with foreign breeds of later introduction.

American Merinos.—Of these there are three classes, or varieties. The *first* is a large, short-legged and hardy sheep, the wool ranging from medium to fine, and without hair when well fed—rarely exhibiting gum externally—their wool thick, and comparatively long on the back and belly, and whiter than that of the French sheep called the Rambouillets, and their skin has the rich rose-color of the latter. The *second* general class of American Merinos are smaller than the preceding—less hardy—wool as a general thing finer—covered with a black pitchy gum on its extremities—fleece about one-fourth lighter than in class first. The *third* class, which have been bred mostly South, are still smaller and less hardy—and carry still finer and lighter fleeces. The fleece is destitute of external gum. The sheep and wool bear a close resemblance to the Saxon; and if not actually mixed with that blood, they have been formed into a similar variety, by a similar course of breeding. Class *first* are a larger and stronger sheep than those originally imported from Spain, carry much heavier fleeces, and in well selected flocks, or individuals, the fleece is of a decidedly better quality.*

The Merino fleece is in Spain sorted into four parcels. The following cut, while it contains the portrait of a Merino ewe, points out the parts whence the different wools are generally procured. The division cannot always be accurate, and especially in sheep of an inferior quality, but it is more to be depended upon in the Merino sheep wherever found, for the fleece is more equally good, and the quantity of really bad wool is very small.

Both Lasteyrie and Livingston agree in this division. The *refina*, or the pick-lock wool begins at the withers, and extends along the back to the setting on of the tail. It reaches only a little way down at the quarters, but, dipping down at the flanks, takes in all the superior part of the chest, and the middle of the side of the neck to the angle of the lower jaw. The *fina*, a valuable wool, but not so deeply serrated, or

* Randall's "Sheep Husbandry."



MERINOS.

possessing so many curves as the *refina*, occupies the belly, and the quarters and thighs, down to the stifle joint. The *terceira*, or wool of the third quality, is found on the head, the throat, the lower part of the neck, and the shoulders, terminating at the elbow: the wool yielded by the legs, and reaching from the stifle to a little below the hock, forms a part of the same division. A small quantity of very inferior wool is procured from the tuft that grows on the forehead and cheeks—from the tail, and from the legs below the hock.

The Spanish wool continues to be highly valued by the manufacturer; and the Spanish breed of sheep will be regarded with interest as the improver of the best old short-wooled ones, and the parent of a new race, spreading through every quarter of the world, and with which, so far as the fleece is concerned, none of the old breeds can be for a moment compared.

Saxon Merinos.—This breed is the result of transferring, nearly a century ago, the best Spanish sheep into Saxony, where they appeared to thrive better than in their native region.

Very great care is taken by the Saxon sheep-master in the selection of the lambs which are destined to be saved in order to keep up the flock: there is no part of the globe in which such unremitting attention is paid to the flock. Mr. Charles Howard, in a letter with which he favored the author, says, that "when the lambs are weaned, each in his turn is placed upon a table, that his wool and form may be minutely observed." The finest are selected for breeding, and receive a *first* mark. When they are one year old, and prior to shearing them, another close examination of those previously marked takes place: those in which no defect can be found, receive a *second* mark, and the rest are condemned. A few months after, they in like manner receive a *third* mark, when the slightest blemish causes a rejection of the animal.

The utmost care is also taken in the housing and feeding of their flocks, evidently aiming rather at a fine staple of wool, than a hardy race of sheep. Mr. Carr, a large sheep-owner in Germany thus describes their management and its effects:

They are always housed at night, even in summer, except in the very finest weather, when they are sometimes folded in the distant fallows, but never taken to pasture until the dew is off the grass. In the winter they are kept within doors altogether, and are fed with a small quantity of sound hay, and every variety of straw, which has not suffered from wet, and which is varied at each feed; they pick it over carefully, eating the finer parts, and any grain that may have been left by the threshers. Abundance of good water to drink, and rock-salt in their cribs, are indispensables. . . . . They cannot thrive in a damp climate, and it is quite necessary that they should have a wide range of dry and hilly pasture of short and not over-nutritious herbage. If allowed to feed on swampy or marshy ground, even once or twice in autumn, they are sure to die of liver complaint in the following spring. If they are permitted to eat wet grass, or exposed frequently to rain, they disappear by hundreds with consumption. In these countries it is found the higher bred the sheep is, especially the Escurial, the more tender.

The American Saxon sheep have been so largely intermixed with

American Merinos, and other imported and native breeds, as to render it difficult to find one of pure breed; yet careful breeders have generally such good stocks, that it is questioned by good authority, whether the admixture, after all, has deteriorated the Saxons among us,—that crossing with Merinos has a tendency to increased hardiness in the animal, without in any important degree affecting the fineness of the wool staple.

The wool of the American Saxons is much finer than that of American Merinos, their fleeces average from two or two and a quarter to three pounds. They are relatively tender, requiring more protection and care than any other imported sheep. They are not as long-lived as the Merinos, do not fatten as well, nor consume as much food. Their lambs are less vigorous and require more care to rear them.

The New Leicester, or Bakewell.—It was about the middle of the last century that Mr. Bakewell, of Dishley in Leicestershire, first applied himself to the improvement of the old Leicesters. This old breed had many good points, yet it had its defects, and these of no trifling character; it was large, heavy, and coarse-grained, the mutton having little flavor, and no delicacy; it was long in the carcass, flat-sided, large-boned, and clumsy; the ewes weighed eighteen or twenty pounds the quarter, the wethers from twenty to thirty pounds. The wool measured from ten to fifteen inches in the length of the staple, and was variable as to quality, but generally coarse. These sheep were slow feeders, and returned little profit.

Such was the stock common to Leicestershire and the adjacent counties, on which Mr. Bakewell began his course of experiments; in the prosecution of which he violated all the old axioms of his day, and proceeded upon principles totally at variance with those by which the breeders had previously regulated their practice. They aimed at size, irrespective of symmetry and aptitude to fatten; and at heavy fleeces, considering weight of wool as of primary importance. Mr. Bakewell on the contrary regarded symmetry and aptitude to fatten as first-rate qualities; he found these to be inherent in small, not in large heavy-boned sheep, which latter consumed an extravagant abundance of food without returning an adequate profit; whereas the smaller sheep he found to increase more rapidly in weight, proportionately, even upon a less consumption of diet. His experience had also taught him another point, viz., that sheep carrying a heavy fleece had always less aptitude to fatten, and were far slower in ripening, than those whose fleece was moderate; and he considered symmetry and early ripening to be of more importance than the loss of a few pounds in the fleece. In short, he considered that the value of the carcass was the first object to be attended to in breeding of sheep; and he looked upon the fleece as of secondary importance—not that the loss of two or three pounds in the fleece was not an object, but still he thought that if to preserve this the farmer not only lost ten or twelve pounds of mutton by it, but had to feed his sheep for twelve or eighteen months longer than he ought, he would pay dearly for his three pounds of wool extra. Mr. Bakewell was right; and on these principles he addressed himself to his task.

The improved Leicesters are not adapted for scanty pasturage, over which the sheep must travel all day in order to procure a sufficiency of food. They require a good, or at least moderate soil, and on this they fatten with incredible rapidity, and are consequently very profitable to the breeder. If in the establishment of this breed Mr. Bakewell erred, it was in the very little regard he paid to the wool, in which his immediate followers imitated him, some even going so far as to prefer sheep with bad fleeces to those with good, as if a fine and perfect carcass and good wool were incompatible with each other. But this false notion is now corrected, and the fleece obtains its due share of attention.

With respect to the quality of the mutton of the improved Leicesters, we do not estimate it so highly as that of some of the short-wooled breeds. When not over fat, it is tender and juicy, but destitute of high flavor; but when fattened to a high degree, the interstices of the fibers of the muscles are replete with fat in such a manner that the line of distinction between fat and lean is almost, as it were, lost; the carcass appears to be a mass of fat, and is any thing but attractive. Besides, such meat is not profitable to the purchaser, though it may be to the cook. We admit, however, that it is the grazier's fault if he carries the fattening process beyond the point at which he ought to stop, whether he regards his own profit or the interest of the consumer. It is the character of the breed to ripen early and quickly. As soon as the sheep are in a proper condition for the butcher, the grazier, instead of wasting more food upon them, should get rid of them, and commence the feeding of another lot, to be disposed of in their turn, as soon as ready.

It is for the accumulation of outside fat that the Leicesters are chiefly remarkable. They have comparatively little loose inside fat or tallow—a point of some consequence to the butcher, who deems this as adding to his profit. By way of a counterbalance, however, the smallness of the head, the thinness of the pelt, and the general greater weight of the carcass than the appearance of the animal would indicate, should be taken into consideration. Whatever it may be to the butcher, "this diminution of offal is advantageous to the grazier; for it shows a disposition to form fat outwardly, and is uniformly accompanied by a tendency to quickness of improvement." In this latter quality the new Leicesters, *cæteris paribus*, are unrivaled.

The new Leicesters, with all their good qualities, are not a hardy race, neither are they so prolific as many other breeds. The ewes seldom produce twins, nor indeed did the founders of this stock deem the production of twins desirable. They aimed at bringing forward the lamb as early as possible, and rightly considered that few ewes could produce two such lambs as would meet with their wishes and realize their object. The fact, moreover, is, that the exclusive attention paid to the establishment of a race, the vital energies of which were to be exhibited in the attainment of early maturity, and in the quick accumulation of fat, while productive of the results aimed at, necessarily entailed counterbalancing deficiencies. A tendency to rapid fattening and early ripeness is not coexistent, as a general rule, with great fertility. In this point, then, the new Leicesters are defective, but less so than formerly. Still the ewes do not yield any great abundance of milk, and the lambs are tender, delicate, and unfitted to endure any great inclemency of weather.

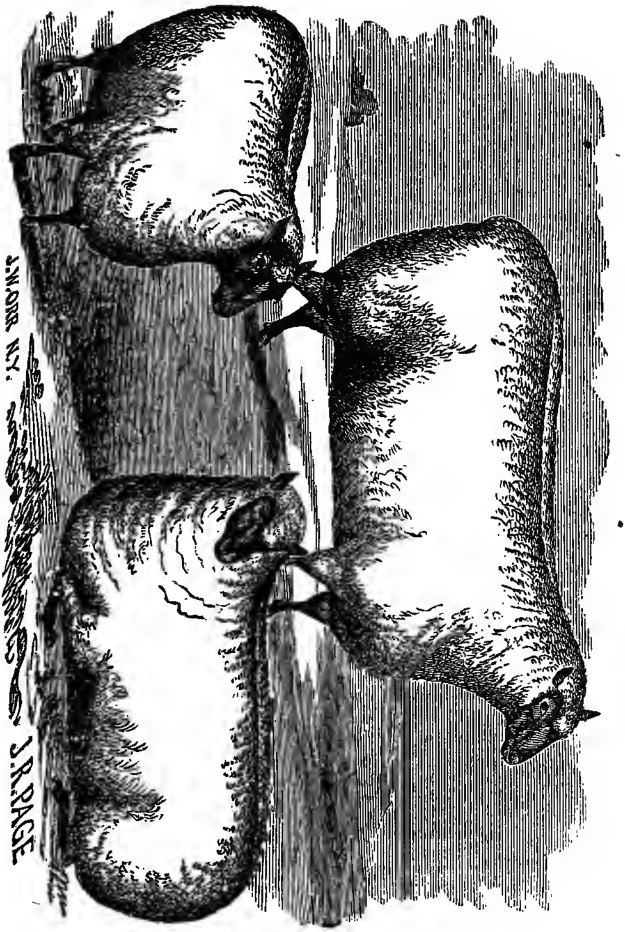
As a whole the *New Leicesters* have not succeeded so well in this country as in England, owing to the severity of our winters and to the heat and dryness of our summers. They do not find that luxuriance and abundance in our pastures so necessary to their highest thrift. Their flesh has not sufficient admixture of lean to be palatable to our people. The breed, however, succeeds well in rich lowland pastures, and yields a profitable return.

The South-Downs.—Formerly the South-Down sheep were very indifferent; it is true that they carried very fine wool, but then the carcass was ill-formed, a disadvantage which more than counterbalanced the excellence of the fleece. They were small, thin in the neck, high in the shoulders and in the loins, down on the rump, with the tail set very low; the back was sharp, the ribs flat, and the fore-quarters narrow; yet there were materials to work upon, and besides, these sheep had some excellent qualifications; they arrived at early maturity, were extremely hardy, thrived upon scanty keep and short feed on the natural pastures, and the mutton was fine-grained and of good flavor.

Attempts were first made to improve on South-Downs by crosses with the Leicesters, a long-wooled sheep, but these attempts ended in utter failure, nor were crosses between them and the Merinos ultimately advantageous. It was by careful selections, and the keeping in view of a definite purpose in the choice of breeding-stock, that the improvement of the South-Downs was achieved. It is to Mr. Ellman of Glynde that the elevation of this breed to its unrivaled position in its own line as a hill sheep is due.

Mr. Culley, in his "Live Stock," 1807, notices the exertions "of the ingenious Mr. Ellman, whose flock is already superior to that of most of his neighbors, both in carcass, quantity, and quality of wool." This enterprising and skillful breeder did not, however, content himself with mediocrity; and in the *Annals of Agriculture*, Mr. A. Young thus speaks of Mr. Ellman's South-Downs: "His flock, I must observe, is unquestionably the first in the country, the wool the finest, and the carcass the best proportioned. Both these valuable properties are united in the flock at Glynde. He has raised the merits of the breed by his unremitting attention, and it now stands unrivaled." Mr. Ellman's own description of them is very unpretending. He says: "They are now much improved both in shape and constitution; they are smaller in the bone, equally hardy, with a greater disposition to fatten, and much heavier in carcass when fat. They used seldom to fatten until they were four years old; but it would now be a rare sight to see a pen of South-Down wethers at market more than two years old, and many are killed before they reach that age." Doubtless the age is reckoned, as is usual with sheep, not from the time when lambed, but from the time of the first shearing.

The average dead weight of South-Down wethers, varies from 100 to 150 pounds. They are very healthy and hardy, seldom affected with the rot and the diseases common with other varieties.



SOUTH-DOWN SHEEP

This animal has a patience of occasional short keep, and an endurance of hard stocking scarcely surpassed by any other sheep, an early maturity not inferior to that of the Leicesters, the flesh finely grained, and the wool of the most useful quality.

The average weight of the fleece of a South-Down hill sheep was stated by Mr. Luccock, in 1800, to be two pounds; it has now increased to three pounds. The fleece of the lowland sheep, that used to be three pounds, is now three and a half, or even four pounds. This is the natural consequence of the different mode of feeding, and the larger size of the animal. The length of the staple in the hill sheep rarely exceeded two inches, and was oftener not more than one and a half inches: it is now more than two inches, and in some of the lowland sheep it has reached to four inches. The number of hill sheep had rather decreased since 1800, and those in the lowlands had materially so; but now that South-Down wool is once more obtaining a remunerating price, the flocks are becoming larger than they were. The color of the wool differs materially, according to the color of the soil. The shortest and the finest wool is produced on the chalky soil, where the sheep have to travel far for their food; but there is a hardness and a brittleness about this wool which was always seriously objected to.

The greater comparative bulk of the fiber, and paucity of serrations, will account for the harshness and want of felting property, which have been considered as defects in this wool. The brittleness of the pile is, perhaps, to be attributed chiefly to the soil. The clothiers were always careful not to use too much of it in the making of their finest cloths. When most in repute, the South-Down was principally devoted to the manufacture of servants' and army clothing, or it was sparingly mixed with other wools for finer cloth. Now, however, when it is materially increased in length, and become a combing wool, and applicable to so many more purposes than it was before—now that it enters into the composition of flannels, baizes, and worsted goods of almost every description—its fineness and its felting, compared with some of the other short wools, render it a truly valuable article. The South-Down sheepmaster justly repudiates the charge of its deterioration—*it has only changed its character*—it has become a good combing wool, instead of an inferior carding one; it has become more extensively useful, and therefore more valuable; and the time is not far distant when the sheepowner will be convinced that it is his interest to make the South-Down wool even longer and heavier than it now is. A sheep possessing such qualities must of course be valuable in upland districts, in the vicinity of markets. They have been introduced into every part of the British dominions, and imported into various other countries. The Emperor of Russia paid Mr. Ellman three hundred guineas for two rams, and in 1800, "a ram belonging to the Duke of Bedford, was let for one season at eighty guineas, two others at forty guineas each, and four more at twenty-eight guineas each." These valuable sheep were introduced into the United States a few years since by Col. J. H. Powell, of Philadelphia, and a small number were imported in 1834. The last were from the flock of Mr. Ellman, at a cost of $60 a head. Several other importations have since taken place.

The Cotswold Sheep.—The Cotswold is a large breed of sheep, with a long and abundant fleece, and the ewes are very prolific and good nurses. Formerly they were bred only on the hills, and fatted in the valleys of the Severn and the Thames; but with the inclosure of the Cotswold Hills and the improvement of their cultivation they have been reared and fatted in the same district. They have been extensively crossed with the Leicester sheep, by which their size and fleece have been somewhat diminished, but their carcasses considerably improved, and their maturity rendered earlier. The wethers are now sometimes fattened at fourteen months old, when they weigh from fifteen to twenty-four pounds per quarter, and at two years old increase to twenty or thirty pounds. The wool is strong, mellow, and of good color, though rather coarse, six to eight inches in length, and from seven to eight pounds per fleece. The superior hardihood of the improved Cotswold over the Leicester, and their adaptation to common treatment, together with the prolific nature of the ewes and their abundance of milk, have rendered them in many places rivals of the New Leicester, and have obtained for them, of late years, more attention to their selection and general treatment, under which management still farther improvement appears very probable. They have also been used in crossing other breeds, and, as before noticed, have been mixed with the Hampshire Downs. It is, indeed, the improved Cotswold that, under the term new or improved Oxfordshire sheep, are so frequently the successful candidates for prizes offered for the best long-wooled sheep at some of the principal agricultural meetings or shows in the kingdom. The quality of the mutton is considered superior to that of the Leicester, the tallow being less abundant, with a larger development of muscle or flesh. We may, therefore, regard this breed as one of established reputation, and extending itself throughout every district of the country.

The Cheviots.—This breed has greatly extended itself throughout the mountains of Scotland, and in many instances supplanted the black-faced breed; but the change, though in many cases advantageous, has in some instances been otherwise, the latter being somewhat hardier, and more capable of subsisting on heathy pasturage. They are, however, a hardy race, well suited for their native pastures, bearing with comparative impunity the storms of winter, and thriving well on poor keep. Though less hardy than the black-faced sheep of Scotland, they are more profitable as respects their feeding, making more flesh on an equal quantity of food, and making it quicker. They have white faces and legs, open countenances, lively eyes, without horns. The ears are large, and somewhat singular, and there is much space between the ears and eyes. The carcass is long; the back straight; the shoulders rather light; the ribs circular; and the quarters good. The legs are small in the bone and covered with wool, as well as the body, with the exception of the face. The Cheviot wether is fit for the butcher at three years old, and averages from twelve to eighteen pounds per quarter—the mutton being of a good quality, though inferior to the South-Down, and of less flavor than the black-faced. The Cheviot, though a mountain breed, is quiet and docile, and easily managed. The wool is coarse and inferior to that of the South-Down.

COMPARATIVE VALUE OF THE DIFFERENT BREEDS OF SHEEP.—On this subject we quote the careful, and to us convincing reasoning of H. S. Randall, Esq., contained in "The Sheep Husbandry:"

"In instituting a comparison between breeds of sheep for wool-growing purposes, I will, in the outset, lay down the obviously incontrovertible proposition that the question is not what variety will shear the heaviest or even the most valuable fleeces, irrespective of the cost of production. Cost of feed and care, and every other expense, must be deducted, to fairly test the profits of an animal. If a large sheep consume twice as much food as a small one, and give but once and a half as much wool, it is obviously more profitable, other things being equal, to keep two of the smallest sheep. The true question then is, with the same expense in other particulars, from what breed will the verdure of an acre of land produce the greatest value of wool?

"Let us first proceed to ascertain the comparative amount of food consumed by the several breeds. There are no satisfactory experiments which show that breed, in itself considered, has any particular influence on the quantity of food consumed. It is found, with all varieties, that the consumption is in proportion to the live weight of the (grown) animal. Of course, this rule is not invariable in its individual application, but its general soundness has been satisfactorily established. Spooner states that grown sheep take up three and one-third per cent. of their weight in what is equivalent to dry hay per day, to keep in store condition. Veit places the consumption at two and a half per cent. My experience would incline me to place it about midway between the two. But whatever the precise amount of the consumption, if it is proportioned to the weight, it follows that if an acre is capable of sustaining three Merinos weighing one hundred pounds each, it will sustain but two Leicesters weighing one hundred and fifty pounds each, and two and two-fifths South-Downs, weighing one hundred and twenty-five pounds each. Merinos of this weight often shear five pounds of fleece, taking flocks through. The herbage of an acre, then, would give fifteen pounds of Merino wool, and but twelve pounds of Leicester, and but nine three-fifths pounds of South-Down (estimating the latter as high as four pounds to the fleece)! Even the finest and lightest fleeced sheep ordinarily known as Merinos, average about four pounds to the fleece, so that the feed of an acre would produce as much of the highest quality of wool sold under the name of Merino, as it would of New Leicester, and more than it would of South-Down! The former would be worth from fifty to one hundred per cent. more per pound than either of the latter! Nor does this indicate all the actual difference, as I have, in the preceding estimate, placed the live-weight of the English breeds low, and that of the Merino high. The live-weight of the four pound fine-fleeced Merino does not exceed ninety pounds. It ranges from eighty to ninety pounds, so that three hundred pounds of live-weight would give a still greater product of wool to the acre.* I consider it perfectly safe to say that the herbage of an acre will uniformly give

* It is understood that all of these live-weights refer to ewes in fair ordinary, or what is called store condition.

nearly double the value of Merino, that it will of any of the English long or middle wools.

"The important question now remains, What are the other relative expenses of these breeds? I speak from experience when I say that the Leicester* is in no respect a hardier sheep than the Merino—indeed, it is my firm conviction that it is less hardy, under the most favorable circumstances. It is more subject to colds, and I think its constitution breaks up more readily under disease. The lambs are more liable to perish from exposure to cold, when newly dropped. Under unfavorable circumstances—herded in large flocks, pinched for feed, or subjected to long journeys—its capacity to endure, and its ability to rally from the effects of such drawbacks, do not compare with those of the Merino. The high-bred South-Down, though considerably less hardy than the unimproved parent stock, is still fairly entitled to the appellation of a hardy animal. In this respect, I consider it just about on a par with the Merino. I do not think, however, it will bear as hard stocking as the latter, without a rapid diminution in size and quality. If the peculiar merits of the animal are to be taken into account in determining the expenses—and I think they should be—the superior fecundity of the South-Down is a point in its favor, as well for a wool-producing as a mutton sheep. The South-Down ewe not only frequently yeans twin lambs, as do both the Merino and Leicester, but she possesses, unlike the latter, nursing properties to do justice by them. But this advantage is fully counterbalanced by the superior longevity of the Merino. All the English mutton breeds begin to rapidly deteriorate in amount of wool, capacity to fatten, and in general vigor, at about five years old, and their early maturity is no offset to this, in a sheep kept for wool-growing purposes. This early decay would require earlier and more rapid slaughter or sale than would always be economically convenient, or even possible, in a region situated in all respects like the South. It is well, on properly stocked farms, to slaughter or turn off the Merino wether at four or five years old, to make room for the breeding stock; but he will not particularly deteriorate, and he will richly pay the way with his fleece, for several years longer. Breeding ewes are rarely turned off before eight, and are frequently kept until ten years old, at which period they exhibit no greater marks of age than do the Down and Leicester at five or six. I have known instances of Merino ewes breeding uniformly until fifteen years old! The improved Cotswold is said to be hardier than the Leicester; but I have said less of this variety, throughout this entire letter, as from their great size† and the consequent amount of food consumed by them, and the other necessary incidents connected with the breeding of so large animals, the idea of their being introduced as a wool-growing sheep anywhere, and particularly on lands grassed like those of the South, is, in my judgment, utterly preposterous. There is one advantage which all the coarse races of

* I speak of full-blooded Leicesters. Some of its crosses are much hardier than the pure bred sheep.

† I saw two at the late New York State Fair, at Saratoga, which weighed over three hundred pounds each.

sheep have over the Merino. Either because their hoofs do not grow long and turn under from the sides, as do those of the Merino, and thus hold dirt and filth in constant contact with the foot, the coarse races are less subject to the visitations of the hoof-ail, and, when contracted, it spreads with less violence and malignity among them. Taking all the circumstances connected with the peculiar management of each race, and all the incidents, exigencies, and risks of the husbandry of each fairly into account, I am fully convinced that the expenses, other than those of feed, are not smaller *per capita*, or even in the number required to stock an acre, in either of the English breeds above referred to, than in the Merino. Nor should I be disposed to concede even equality, in these respects, to either of those English breeds, excepting the South-Down.

"You write me, sir, that many of the South Carolina planters are under the impression that coarse wools will be most profitably grown by them, *first*, because there is a greater deficit in the supply, and they are better protected from foreign competition; and, *secondly*, because they furnish the raw material for so great a portion of the woolens consumed in the South. Each of these premises is true—but are the conclusions legitimate? Notwithstanding the greater deficit and the better protection, do the coarse wools bear as high a price as the fine ones? If not, they are not as profitable, for I have already shown that *it costs no more to raise a pound of coarse than a pound of fine wool.* Nay, a pound of *medium* Merino wool can be raised *more cheaply* than a pound of the South-Down, Leicester, or Cotswold! This I consider clearly established.

"Grant that the South requires a much greater proportion of coarse than of fine wool, for her own consumption. If a man needing iron for his own consumption wrought a mine to obtain it, in which he should happen to find gold equally accessible and plentiful, would it be economical in him to neglect the more precious metal because *he* wanted *to use* the iron? or should he dig the gold, obtain the iron by exchange, and pocket the difference in value? Would it be economical to grow a surplus wool, wool for market, worth from twenty-five to thirty cents per pound, when it costs no more per pound to grow that worth from forty to forty-five cents? And even for the home want, for the uses of the plantation—for slave-cloths, etc.—*fine wool is worth more per pound than coarse for actual wear or use!* Is this proposition new and incredible to you? I challenge the fullest investigation of its truth, through the testimony of those familiar with the subject, or through the direct ordeal of experiment. It is true that a piece of fine broadcloth is not so strong, nor will it wear like a Chelmsford plain of treble thickness. The threads of the former are spun to extreme fineness to economize the costly raw material. To give it that finish which is demanded by fashion—to give it its beautiful nap—these threads are still further reduced by "gigging" and "shearing." But spin fine wool into yarn as coarse as that used in Chelmsfords, and manufacture it in the same way, and it would make a far stronger and more durable cloth. The reasons are obvious. Merino wool is decidedly stronger than the English coarse long and middle wools—or any other coarse wools—in proportion to its diameter or bulk. It felts far better, and there is therefore a greater cohesion between the different fibers of the same thread, and between the different threads. It is also more pliable and elastic, and consequently less subject to "breaking" and abrasion.

"Unless the views I have advanced are singularly erroneous, it will be seen that, for wool-growing purposes the Merino possesses a marked and decided superiority over the best breeds and families of coarse-wooled sheep. As a mutton sheep, it is inferior to some of those breeds, but not so much so as is generally supposed. If required to consume the *fat and lean together*, many who have never tasted Merino mutton, and, who have an unfavorable impression of it, would, I suspect, find it more palatable than the luscious and over-fat New Leicester. The mutton of the cross between the Merino and "Native" sheep would certainly be preferred to the Leicester, by any body but an English laborer used to the latter. It is short-grained, tender, and of good flavor. The same is true of the crosses with English varieties. These will be hereafter, more particularly alluded to. Grade Merino wethers (half-bloods) are favorites with the Northern drover and butcher. They are of good size—extraordinarily heavy for their apparent bulk*—make good mutton—tallow well—and their pelts, from the greater weight of wool on them, command an extra price. They would, in my opinion, furnish a mutton every way suitable for plantation consumption, and one which would be well accepted in the Southern markets.

"In speaking of the Merino in this connection, I have in all cases, unless it is distinctly specified to the contrary, had no reference to the Saxons—though they are, as it is well known, pure-blooded descendents of the former."

GENERAL MANAGEMENT OF SHEEP.—Their Summer Management.—The change in spring from dry to succulent food, produces in all sheep a certain degree of scouring, and which, if precautions have not been taken to guard against it, soils the wool on the hinder parts of sheep, and its subsequent removal becomes difficult. To prevent this, every sheep before being turned to grass in the spring should have that portion of the wool which is liable thus to become soiled carefully clipped away, including that which immediately surrounds the roots of the tail, covers the thighs, the bags of the ewes, etc. This operation saves the wool, which would otherwise be lost, the animal much subsequent suffering, and the owner much labor. *Tagging* sheep, therefore, should not be neglected by any careful shepherd.

It is scarcely necessary to say that the fields in which sheep are to run should be carefully cleaned of every variety of *burr*, by which so much wool is annually lost in this country, being so matted together with them as to be of little comparative value.

Care in the handling of Sheep should always be exercised. They never should be lifted by the wool, for, as the skin adheres so loosely, it is often separated from the body by the act of lifting, and blood has often been found settled beneath the parts thus improperly handled. The legs or necks of sheep are the parts by which only they should be seized;

* On account of the shortness of their wool, compared with the coarse breeds.

and for catching sheep the shepherd's crook is a very simple yet very convenient instrument. It is thus described by Mr. Stephens:

"The hind-leg is hooked in from behind the sheep, and it fills up the narrow part beyond while passing along it until it reaches the loop, when the animal is caught by the hock, and when secured, its foot easily slips through the loop. Some caution is required in using the crook, for, should the sheep give a sudden start forward to get away the moment it feels the crook, the leg will be drawn forcibly through the narrow part, and strike the bone with such violence against the bend of the loop as to cause the animal considerable pain, and even occasion lameness for some days. On first embracing the leg, the crook should be drawn quickly toward you, so as to bring the bend of the loop against the leg as high up as the hock, before the sheep has time even to break off, and being secure, its struggles will cease the moment your hand seizes the leg."

The Season of Lambing requires the shepherd's especial care. From the first to the middle of May is the best season. In the general course of breeding, however, it is desirable that the lambs should not fall until the cold of winter is over, and the pasture begins to afford some food for the little ones. This is peculiarly important in bleak and exposed situations. Thousands of lambs die every year from the cold to which they are exposed as soon as they are yeaned. On the other hand, there may be some inconvenience and danger if the period of lambing is too late. Hot weather is as fatal to the mother as cold is to the offspring. It frequently induces a dangerous state of fever; and both the mother and the lamb may be then injured by the luxuriance of the grass. If the lamb falls late in the season, it will be longer ere the ewe can be got ready for the butcher, and the ground cleared for other stock; and, in addition to this, the early lambs become larger and stronger, and better able to resist the cold of the succeeding winter. The yeaning time will, therefore, be regulated by the situation of the farm, the nature of the pasture, and the demand from the neighboring markets.

The duration of pregnancy is about five months, or one hundred and fifty-two days, with comparatively little deviation. As the end of this period approaches—and it should not be a matter of memory merely, but of record—the flock should receive the grazier's watchful attention. The ewes should be separated from the rest of the flock, and in an inclosure, in which is a shed or covert from the storms, which are so common, and so destructive to young lambs.

Care of the Lambs.—It is the duty, and would be the interest, of the farmer to attend to the comfort of his ewes and lambs at this period; the lambing-field should always be a sheltered one, and there should be a temporary or a permanent retreat for the weakly and the cold. The first care of the shepherd therefore should be to examine the newly-dropped lamb. If they are chilled and scarcely able to stand, he should give them a little of the milk, which he carries always with him, and then take them to some shelter, or place them in a basket well lined with straw. Nursing of this kind for an hour or two will usually give the animal sufficient strength to rejoin its mother.

Nature has given to the sheep, as well as to otner animals, an instinctive and strong affection for its young; an affection which strengthens in proportion to the necessities of the parent and the offspring. The more inhospitable the land is on which they feed, the greater their kindness and attention to their little ones; nevertheless, it will occasionally happen that the young ewe, in the pain and confusion and fright of her first parturition, abandons her lamb. Some, when the udder begins to fill, will search it out again, and with unerring precision—others, severed from their offspring before they had become acquainted with its form and scent, are eagerly searching for it all over the field with incessant and piteous bleatings. Some will be hanging over their dead offspring, while a few, strangely forgetting that they are mothers, are grazing unconcernedly with the rest of the flock.

There is another circumstance that adds to the confusion. Some of the ewes have had twins; they have inadvertently strayed from one of them, or stupidly or capriciously have driven it from them; and the neglected one is wandering about, vainly seeking its parent, or angrily repulsed by it.

The first thing a lamber has to do is to remedy as well as he can this confusion. He first seeks out for those that have twins, and that have recognized both of their lambs, and, taking his little marking-bottle and marking-iron, he puts a particular mark on each of the twins, by which he may again recognize them, and on each pair he puts a different mark. If they are just dropped, and are weak, he leaves them for a while; but if they are able to travel a little, he drives them into a pound, or into a corner of the field with the other twins, or he at once removes them into another and somewhat better pasture, which he had destined for the twins.

He then looks for the lambs that have apparently been abandoned by the mother, and if, as he takes one of them up, it bleats, he will presently find whether there is any responsive call or gaze of recognition. If the mother eagerly calls to it, he has but to put it down, and she will speedily rejoin and suckle it, if it is strong enough to raise itself from the ground for this purpose. If the animal is almost exhausted, he must catch the ewe, and assist her to suckle the lamb. It will soon revive, and her love for it will revive too. If she merely gives a careless look of recognition, he must suckle the lamb from his bottle of ewe's milk, and leave it for a while; perhaps her affection will return when her udder begins to be distended with milk; if not, he must drive her with others into a fold, and, suffering the rest to escape, try every means to induce her to let the little one suck. There may be considerable difficulty in this at first, but, by the exercise of some patience and tact, he will generally succeed. After all, however, he will probably have some lambs upon his hands for whom he cannot find a mother, or whose own mother will not suckle them.

On the other hand, he will find some ewes who are gazing mournfully on their dead lambs. With some contrivance, he will generally find in these foster-mothers for his abandoned ones. He ties a piece of cord round the hind feet of a dead lamb, and the mother, if she has not been unnecessarily frightened by the lamber, or his dog, will follow for miles with her nose close to the lamb, and may be led wherever the shepherd chooses.

The Substitute Lamb.—The bereaved and affectionate ewe is induced to follow the remains of her little one to the lambing pound, or to some other convenient place. A lamb that has lost, or been abandoned by its mother is then selected. The head, tail, and legs of the dead lamb are cut off; an incision is made along the belly, and the body turned out, and this skin is then drawn over the substitute lamb. The body of the dead lamb is opened, the liver taken out, and the head and legs of the living lamb, and what other parts the skin does not cover, are smeared with blood. In the darkness of the night, and after the skin has been warmed on it, so as to give something of the smell of her own progeny, the substitute is put to the bereaved ewe. In the majority of cases the fraud is altogether successful, and the impostor is at once received, and fondled, and suckled. This being effected, the shepherd hastens to remove the false clothing; the lamb is returned to her, and "whether it is from joy at this apparent reanimation of her young one, or because a little doubt remains on her mind, which she would fain dispel, cannot be decided; but for a number of days she shows more fondness by bleating over and caressing this one, than she did formerly over the one that was really her own."

If she does not take to it at first, she must be compelled to suckle it, and confined so that she shall not be able to kick or otherwise hurt it. In two or three days she will generally own it, and then they may be turned together into the field without any apprehension or trouble.

Care, however, should be taken that the age of the substitute lamb and that of the true one should correspond as much as possible. If a amb lately dropped is put to a ewe whose young one would have been a week or two old, the milk will be too strong, and a purging will be set up, which, probably, no medicine can arrest. On the other hand, if the substitute lamb is a week or two old, and the foster-mother had lost hers in the act of yeaning, her milk will be injurious on account of that purgative quality by which the intestines of the newly-dropped lamb are first excited to action. Sometimes the foster-lamb, frightened or exhausted, will not readily take the teat, however disposed the ewe may be to adopt and feed it. Care should be taken to ascertain whether this is the case, and, if necessary, the lamb should be held while a little of the milk is pressed into its mouth from the udder. This will rarely need to be repeated, for instinct will teach it where to seek and how to obtain its proper nutriment.

After-Care of the Lambs.—In the course of a little more than a week, the great majority of the ewes will have produced their young, and the lamber will have more leisure for those cases which particularly require his attention. The twin-field will particularly demand his care. He will seldom enter it on the morning without finding some degree of confusion. Some of the lambs will have strayed from or been abandoned by their mothers; and these twin-mothers are sometimes not a little capricious, and especially when, not having sufficient milk for the two, they are teased and worried by the incessant sucking of the twins. In such case they will, in the most determined and furious manner, repulse one of them. Amid the intermingling of the offspring of the different ewes he will find the advantage of having marked the respective twins, and thus, although not always without regularly drawing them off, he will be enabled properly to separate the respective families: he will relieve the weakly ewe from a burden which she cannot support; and, on the other hand, he will reconcile the deserted little one to its unnatural parent, or find a better mother for it. The ewes with their single lambs will not, after a few days, require any extraordinary degree of trouble, but those with twins must be carefully watched, at least until the lambs begin in good earnest to graze. Many a lamb has been stinted in its growth, and irreparably injured, by the insufficient supply of milk which the ewe with twins can afford.

Twins.—This is the proper place to speak of the desirableness of having many twins. Most breeders are partial to them, on account of the apparent rapid increase of the flock, or the additional quantity of lambs that can be prepared for the market. The question depends entirely on the quantity of land which the farmer holds, and the nature of the soil. If he has pasture enough, and good enough, twins are highly desirable; for at only the usual expense before the yeaning time, the number of his lambs is doubled, and, the pasture being good and the lambs well fed, there will be very little difference in health, condition, or value, between the twins and the single lamb.

The ewe seldom has twins at her first yeaning; and it is fortunate that she has not; for it is seldom that she has any great supply of milk then, and, consequently, the mother and her offspring would equally suffer. The twins are generally obtained from ewes that are three, four, or five years old. The disposition to twinning is undoubtedly hereditary. There are certain rams that have the credit of being twin-getters, and that faculty usually descends to their offspring; but this is oftener the case with regard to the ewe, agreeably to the old couplet:

> "Ewes, yearly by twinning, rich masters do make:
> The lambs of such twinners for breeders go take."

The female of every species of animal has far more to do with this unusual multiplication of the offspring than has the male; and the farmer who wishes rapidly to increase his stock through the medinm of twins, may go some way toward the accomplishment of his object by placing his ewes on somewhat better pasture, or allowing them a few turnips when November approaches.

The Management of the Lambs.—We return once more to the lambs, now a few days old. The old ewes will prove assiduous and faithful nurses, but the young ones will occasionally wander from their lambs, and prove inattentive to or have not recognized their bleatings. Such mothers must be separated from the flock, and folded and confined with their young ones, until they appear to be disposed faithfully to do their duty. Some lambs refuse the attention of the mother, and lie weak or sullen, and droop away and die. Some of the mother's milk should be frequently introduced into the mouth; and, if that has not the desired effect, a foster-mother must, if possible, be found; or the little churl must be brought up by the hand. There will, generally speaking, be very little difficulty about this. If it is at first fed with warm sheep's or cow's milk, by means of a spoon, until it is old enough to suck out of a sucking-bottle, it will soon begin to bleat for its food, and greedily meet the bottle the moment that it is presented to it.

The *cuckoo* lambs will require the particular attention of the shepherd. They are those that are dropped later than the others, when the cuckoo is just making his appearance, and after whom they are named. They are usually the progeny of very young or very old mothers, who were not impregnated so soon as the others, and who generally are not so strong and so hardy as the rest of the flock. Care must be taken that they have sufficient, yet not too nutritive food; and that the diseases to which weakly lambs are subject are promptly attended to.

Some ewes will permit other lambs beside their own to suck them, and then there will possibly be one or more greedy lambs, who will wander about from ewe to ewe, robbing the rightful owner of the greater part of his share. He and his mother must be removed to another pasture, where he will soon learn to satisfy his voracious appetite with the grass. As the shepherd takes his round he should inspect every lamb. If one does not appear to thrive, he should endeavor to ascertain the cause. Has the mother any or sufficient milk? Are the teats free from disease? He should either supply the deficient nutriment, or provide a foster-mother. Does the milk disagree with the lamb? Is there any or considerable purging? The calves and sheep's cordial must be immediately resorted to; and, if necessary, nursing, or separation from the mother. In two or three weeks, and often considerably sooner, the lambs will begin to nibble a little grass. Is it too luxuriant for them, or has it been eaten down close by the ewes, and is the owner thinking of providing a fresh pasture? Let him beware! There is no situation in which the old advice of not making "more haste and good speed" should be more carefully heeded than in this. If one paramount cause of disease, and fatal disease to lambs, were selected, it would be a sudden change from bare to luxuriant pasture. It often sets up a degree of inflammatory fever, which no depletion will extinguish, or a diarrhœa which no astringent can check.

The technical term which the shepherd applies to the lamb diseased from this cause is *gall-lamb*. The liver seems to be the principal seat of inflammation, and a great quantity of bile or *gall* is found in the duodenum and small intestines; a portion of it has frequently regurgitated into the abomasum or fourth stomach, and some has entered into the circulation, and tinged the skin and flesh of a yellow color. It is a disease which very speedily runs its course; occasionally carrying off its victims in a little more than twelve hours, and seldom lasting more than three days. Immediate bleeding in the early stage, and afterward Epsom salts, with a small portion of ginger, will afford the only chance of a cure. The poor animal is often condemned and slaughtered at once—that is barbarous work.

Castration.—There is a great difference of opinion as to the time when the tup-lambs that are not intended to be kept for breeding should be castrated. Some recommend the performance of this operation as early as three days after the birth. Mr. Parkinson says that "he has several times cut a lamb the very day that it was lambed, when strong and healthy, and that he never knew one do ill from the operation." The proper period depends a great deal on the weather, and on the stoutness of the lamb, and varies from the third or fourth to the fourteenth or twenty-first day, the weather being cool or even cold, and somewhat moist. It would be highly improper and dangerous to select a day unusually warm for the season of the year. The absence of unusual warmth, and the health of the animal to be operated upon, are the circumstances which should have most influence in determining the time.

There are two methods of performing the operation. The lamb being well secured, the operator grasps the scrotum or bag, and forces the testicles down to the bottom of it. He then cuts a slit across the bottom of the bag, in a direction from behind forward, through the substance of the bag, and large enough to admit of the escape of the testicles. They immediately protrude through the incision, being forced down by the pressure above. The operator then seizes one of them, and draws it so far out of the bag that a portion of the cord is seen; and then, if he is one of the old school, he seizes the cord between his teeth and gnaws through it. This is a very filthy practice, and inflicts some unnecessary pain. The testicle being thus separated, the cord retracts into the scrotum, and is no more seen. The other testicle is brought out and operated upon in a similar manner. Very little bleeding ensues—and the young one may be returned to its mother. An improvement on this operation, and which any one except of the lowest grade would adopt, is to use a blunt knife instead of the teeth. By the sawing action which such a knife renders necessary, the artery is even more completely torn than with the teeth; and yet without so much bruising of the part, and probability of ensuing inflammation. It is by the laceration, instead of the simple division of the cord, that after-bleeding is prevented.

Another way of performing the operation is to push the testicles up toward the belly, and then, grasping the scrotum, to cut off a sufficient portion of the bottom of the bag to admit of the escape of the testicles when they are again let down. They are, one after the other, pushed out, and taken off in the manner already directed. The wound is considerably longer in healing when the base of the bag is thus cut away, and the animal consequently suffers more pain. The first is the preferable way, if the incision is made sufficiently long to prevent its closure for two or three days, thus leaving an outlet for the escape of the blood and pus from the inside of the bag.

There is usually little or no danger attending the operation, and yet occasionally it is strangely fatal. In a whole flock not a single lamb will sometimes be lost; but at other times the deaths will be fearfully numerous, the same person having operated on both occasions. Much, probably, depended on some peculiar state of the atmosphere, of the actual nature of which we know nothing at all; and more probably might be connected with a disposition to inflammation in the patient proceeding from too high feeding, or from a debilitated state of the frame, and which had not been observed or properly estimated.

When fatal disease occurs after castration it usually assumes the form of tetanus, or locked-jaw. The village operator pretends to tell when this will or will not supervene. The usual struggles of the animal, or the usual expressions of pain, he does not regard; but when, as he is gnawing the cord asunder with his teeth, he feels a deep and universal shudder of the animal, he says at once that that lamb will die. He is often right about this, and when he is, it can be easily explained. By the fearful torture he has inflicted, he has caused a shock of the whole of the nervous system, from which the poor sufferer can never perfectly recover.

Occasionally, when the lamb that was selected as a breeder does not turn out well, it is necessary, in order to fatten him and to make his flesh salable, to castrate him. There are various ways of performing this operation on the young or fully adult sheep. Some proceed precisely as with the horse. An incision is made into the scrotum; the testicle is forced out, the iron clamps are put on the cord, which is then divided between the clamp and the testicle, and the cautery is had recourse to in order to sear the part and prevent bleeding. This operation usually succeeds well, but it is not every operator on sheep that has the clamps or the firing-iron.

The preferable way of operating is, to tie a waxed cord as tightly as possible round the scrotum above, and quite clear of the testicles. The circulation will here also be completely stopped, and usually in two or three days the scrotum and the testicles will drop off. Accidents have occurred, but which are attributable to the operator; he has included a portion of the testicle in the ligature, and thus laid the foundation for very great and fatal inflammation; or he has used too large a cord, and which could not be drawn sufficiently tight; or the knot has slackened and the ligature has pressed sufficiently to produce excessive inflammation and torture, but not completely to cut off the supply of blood. Care being taken in the application of the cord to the exact part, and the tightening of the ligature, the animal seems scarcely to suffer any pain; indeed, the nerves are evidently deadened by the compression of the cord, and no accident occurs.

Docking.—There is much variety of opinion among sheep-masters as to the time when this operation should be performed. Some, like Mr. Parkinson, think that it should be done within a very few days after the birth; the ewes on the first, second, or third day, and the male lambs when they are castrated. The author of the "Complete Grazier" would defer it until the lambs are three or four months old. This must depend on the state of the weather, and the health of the animals. No one should dock his lambs when the weather is very cold, because the bushy tails of the animals afford a great deal of warmth. On this account, in particularly exposed situations, it is deferred until the warm weather sets thoroughly in, and by some, and particularly with their ewes, not practiced at all. The tail certainly affords both protection and warmth to the udder, and likewise defense against the dreadful annoyance of the flies in hot weather; but, on the other hand, it permits the accumulation of a great deal of filth, and, if the lamb or the sheep should labor under diarrhœa, and the shepherd should be somewhat negligent, the tail may cling to the haunches, and that so closely as to form an almost insuperable obstruction to the passage of the fæces. It likewise can scarcely be denied that the removal of the tail very much improves the beauty of the animal, by the fullness and width which it seems to impart to the haunches.

The operation is a very simple one. An assistant holds the lamb with its back pressing against his belly, and thus presenting the haunches to the operator, who, with a knife, or a strong pair of scissors or forceps, cuts it off at the second or third joint from the rump. A few ashes are then sprinkled on the wound—common flour would do as well, in order to form a coagulum over the part and stop the bleeding. It is seldom that the bleeding will continue long; but, if the lamb should appear to be growing weak in consequence of the loss of blood, a piece of twine tied tightly round the tail, immediately above the dock, will at once arrest the hemorrhage; the twine, however, must be removed twelve hours afterward, otherwise some sloughing will ensue, and care must likewise be taken that the incision is made precisely in the joint, otherwise the wound will not heal until the portion of bone between the dock and the joint above has sloughed away.

Spaying.—A few weeks after castrating the spaying of the rejected ewe-lambs will succeed, an operation which will materially contribute to their increase of growth and disposition to fatten. It is singular that this practice should be almost confined to Great Britain and to Italy, for there can be no manner of doubt of the advantage of it. Daubenton, however, in his "Instructions to Shepherds," gives a useful account of the manner in which it is best performed.

At the age of six weeks, the ovaries are grown sufficiently large to be easily felt, and that is the time usually selected for the spaying, being immediately after the first formal examination of the flock. The lamb is laid on her right side, near the edge of a table, with her head hanging down by the side of the table; an assistant stretches out the left hind-leg of the animal, and holds it in that situation, with his left hand grasping the shank; and in default of a second assistant, he also holds the two fore-legs, and the other hind-leg with his right hand. The lamb being thus disposed, the operator, tightening the skin of the part, makes an incision of an inch and a half in length, midway between the top of the haunch and the navel, and penetrating through the skin; another incision divides the muscles of the belly and the peritoneum. A careful operator will, perhaps, make three incisions, the first through the skin, the second through the abdominal muscles, and the third through the peritoneum. He then introduces his forefinger into the abdominal cavity, in search of the left ovary, which is immediately underneath the incision; and, having found it, he draws it gently out. The two broad ligaments, and the womb and the right ovary, protrude at the same time. The operator cuts off the two ovaries, and returns the womb and its dependencies; he then closes the womb by means of two or three stitches through the skin, carefully avoiding the abdominal muscles below; and, last of all, he rubs a little oil on the wound, or he does nothing more, but releases his patient.

The lamb very probably will be unwilling, and perhaps will altogether refuse to suck or to graze during the first day, but on the following days he will feed as usual. In ten or twelve days the wound will have perfectly healed, and the threads may be cut and taken away. The only thing to be feared is inflammation of the peritoneum, which was divided in the operation; but this rarely occurs, and, on the whole, there is not so much danger in the spaying of the ewe-lamb, as in the castration of the tup.

Sheep-Washing.—This is best done in vats constructed for the purpose, and where large flocks are to be washed, the expense and care are well repaid. These vats are to be so located as that the water can be conveniently let into them by spouts, and a small stream, dammed up, will answer the purpose. The vat should be about three and a half feet deep, and of such size as to admit two spouts to flow into it at the upper end, at which two men can wash, while two others can be so employed at its lower end and over which the water flows. The vat should have a gate to draw off the water as often as fifty sheep are washed. A platform should connect the top of the vat with the sheep-yards, of which there should be two, one to contain the unwashed, and the other the washed sheep; lambs, on account of their liability to accident, should not be driven with the flocks to the washing-pens. The operation of washing is facilitated, and rendered much easier by heavy rains immediately preceding it, and which have thoroughly saturated the fleeces. Sheep are more generally injured while washing than in any other way, and hence, at this time the utmost care is needed in handling them.

Sheep-Shearing.—This, in fair weather, may be done in from five to six days after washing. The operation should always be carefully done, and by those only who are experts in the art. This is equally dictated by the true interest of the wool-grower—as by no others can the fleeces be kept and put into proper merchantable shape—and by humanity, as clumsy shearers clip and mutilate, and otherwise often shamefully abuse the uncomplaining sheep.

Every thing being arranged, a shearer seizes a sheep, and sets it on its rump, and keeps it in this position by resting the back against his own legs. He removes all straws, thorns burs, etc., that may have adhered to the wool. While thus held, the wool is removed from the head and neck as far as the shoulders, and also from the belly, the scrotum, and the edge of the thighs. The head of the animal is then bent down sidewise, and the shearer, placing a leg on each side of the neck of the sheep, pushes out the opposite ribs by pressing his knees gently against the ribs that are nearest to him. He next shears the wool from the far side with his left hand, from the belly to the middle of the back, and as far down as the loins. The sheep is now turned, and the right hand is employed to shear the wool from the near side. The sheep is then laid flat on its side, and kept down by the shearer with his face toward the rump of the sheep, resting his right knee on the ground in front of the neck, and his right toe being brought to the ground a little behind and below the poll; the head and neck of the sheep are thus confined by his right leg, while he uses his right hand to shear the wool from the hind quarter. In this way the clips of the shears will appear in concentric rings round the body of the sheep. The dirty portions of wool about the tail are then removed by the shears and kept by themselves; the outside of the fleece is folded inward, beginning at the sides, and narrowing the whole fleece into a strip about two feet wide. This strip is then rolled firmly up from the tail end toward the neck.

WINTER MANAGEMENT.—Sheds, to shield sheep from cold rains, sleety storms, and from piercing winds, are at once dictated by humanity and true economy; but every arrangement for thus housing sheep should provide for free ventilation, as the health of none other of our domestic animals is so entirely dependent on pure air as that of the sheep.

Winter Food.—Hay is the staple winter food of sheep in the United States. Morrell, in *The American Shepherd*, states the daily quantity, in cold weather, which a sheep weighing one hundred pounds will consume, at two and a half pounds; and if every one hundred sheep should have a daily supply of from six to eight quarts of corn, or its equivalent in cut potatoes or other roots, the increased thrift of the flock, and their larger return of better wool, would richly repay the extra cost and trouble.

When the foddering season arrives, the flock should be arranged into as many apartments as circumstances will admit. A small one of the oldest and poorest should have the preference as to accommodation and attention, and to it should be added occasionally such as may from any cause be declining; and such as have sufficiently recruited in this department may give place to them. This flock should be fed with grain and roots, as their condition and circumstances may require, through the winter. So with the lambs, a flock of the smallest and poorest should be managed in the same way.

When assorting and arranging for the winter, the feet and toes of all should be cut and trimmed to a proper shape; and the ends of the horns of all such as incline to branch out should be sawed off. The whole should have free access to water and salt through the winter, and should be fed with hay, in boxes, plentifully and regularly three times a day; under cover when cold or stormy, outside when fair, if more convenient; and in rain-storms should be confined under cover. It is convenient to let them have free access to straw, in boxes, at all times, and occasionally a change of the different kinds of hay and corn fodder. The sheds should at all times be well littered.

The proper time to put bucks with ewes is the first of December, which is generally after they are arranged for winter, and that arrangement should be made with reference to that object, allowing but one buck to a flock; and no wether should be allowed in a flock with a buck, as his presence creates suspicion, and disturbs the quiet so necessary to the desired performance. The number of ewes to a buck will vary according to his age, vigor, and keeping; a full-grown, vigorous one, well fed, will serve one hundred; the same, without extra feed, will serve fifty; young ones from thirty to forty. The bucks should be painted on the breast to make apparent their progress. Four weeks is sufficient time for them to remain with the ewes; after that, there is danger of the ewes being injured by their ungallant and knock-down propensities.

MEDICINES EMPLOYED IN THE TREATMENT OF SHEEP.—Simple medicines ought to be in the possession of the farmer for instant use in cases of emergency; but the administration of the more potent drugs ought to be intrusted to the veterinary surgeon, by whom alone all important operations ought to be performed. Read's enema and stomach-pump adapted to sheep, should be in every breeder's hands, and kept constantly ready for use. In the treatment of many of the diseases of sheep, the advantages of purgative or of sedative injections are too much overlooked. Aperient injections may consist of a handful of common salt, or an ounce or two ounces of Epsom salts, with a wineglassful of linseed oil, mixed in a pint of water or thin gruel. Sedative injections, in cases of diarrhœa and dysentery, may consist of a pint of gruel or starch, with three or four grains of powdered opium, or fifty drops of laudanum.

Aperients.—In administering medicines to the sheep, the fluid should be allowed to trickle slowly and gently down the gullet or œsophagus, as we have already urged in the case of the ox, and for the same reasons—the structure of the stomach being in both animals on the same plan. To give medicine in a hurried manner, so as to force the animal to gulp it, is to defeat the very object intended; it will force the pillars of the œsophagean canal, enter the insensible paunch, and there continue inert. It may here be as well to observe, that the doses of medicine for sheep, in general are about one-sixth in quantity of what are usually given to cattle. Young lambs require only a third, or half the quantity of medicine constituting a dose for an adult sheep.

The following medicines are the most valuable aperients:

Common Salt (Chloride of Sodium or Muriate of Soda).—Salt is a tonic in moderate doses, and of great benefit in the rot. It should always be accessible to the flock. In doses of one or two ounces, dissolved in four or six ounces of gruel, it forms an excellent aperient.

Epsom Salts (Sulphate of Magnesia).—An excellent purgative, and that which is most commonly employed. Its dose ranges from half an ounce to two or three ounces. The repetition of small doses at intervals of six hours will keep up the action of the first full dose when desirable; or sulphur may be employed for this purpose.

Sulphur.—Sulphur, besides its value in cutaneous affections, is very useful as an aperient, especially for keeping up the action of the bowels after the operation of salts. Dose, from one to two ounces. Sulphur is the base of every ointment for the cure of mange.

Aloes.—This drug is not only very uncertain in its operation in sheep but has often proved fatal, by inducing direct inflammation. It is invaluable as a horse medicine, but should never be administered to the sheep.

Linseed Oil.—Linseed oil is occasionally used as a purgative; it is given in doses of two or three ounces.

ALTERATIVES AND SPECIFIC MEDICINES.—These are medicines which exert a peculiar influence on certain organs, altering their diseased action, or stimulating their respective secretions. Some act more especially on the liver, others on the glandular system, and some on the skin; while one exerts a peculiar action on the muscular fibers of the uterus. A knowledge of the effects of these medicines has been gained by experience; but we know nothing of their *modus operandi*.

Calomel (Submuriate or Protochloride of Mercury).—Calomel is seldom used in the treatment of the diseases of the sheep. In cases of rot, two or three grains of calomel, mixed with a grain and a half of opium, have been found beneficial; this dose may be repeated every day, or every other day, for several times, its effects being watched.

Sulphate of Mercury or Æthiops Mineral.—As an alterative medicine, useful in cutaneous disorders, Æthiops mineral has long enjoyed great reputation; it is usually combined with nitre and sulphur in the following proportions for a daily dose: Æthiops mineral, one scruple; nitre, two scruples; sulphur, four scruples.

Iodine.—Iodine is useful both as an external application, and also as a medicine taken internally, in cases of glandular affections and indurated swellings of the udder. Its most convenient form is the iodide of potassium. An excellent ointment is composed of one part of the iodide and seven of lard.

Iodide of potassium is strongly recommended in consumption, when tubercles have formed on the lungs. The dose is two grains, gradually increased to four or six, given morning and evening, in a little gruel.

Ergot of Rye.—In cases of lingering parturition, when the powers of the uterus are exhausted, ergot of rye is found very useful. It exerts a peculiar action on that organ, and arouses its dormant energy. It should be employed with caution. The dose is a scruple or half a drachm, repeated at intervals of half an hour, if necessary. An infusion of ergot of rye is used by lambers and shepherds, conjoined with a cordial composed of equal parts of brandy and spirits of nitre (*sp. æther nitrici*).

SEDATIVE AND FEBRIFUGE MEDICINES.—These are medicines calculated to allay fever and moderate the action of the arterial system. Among these, nitre or nitrate of potass, tartar emetic, or tartrate of antimony, and the powder of digitalis, *i. e.*, of the dried leaves of the foxglove, are chiefly in requisition. Opium, or tincture of opium (laudanum), is in a certain sense a sedative; indeed, in some diseases, its use in allaying irritation cannot be overrated.

Nitrate of Potass.—Nitre is used as a febrifuge with good effect, but generally in combination with other medicines. Its dose is from half a drachm to a drachm.

Tartrate of Antimony.—The effect of this medicine, in lowering the action of the heart and arterial system, is very decided. Hence in many inflammatory diseases it is of great importance. It is given to the sheep in doses of five or six grains.

Digitalis.—The powdered leaves of the dried foxglove have been long esteemed for their decided effects upon the action of the heart. They not only reduce the force of the pulse, but often render it intermittent. Digitalis, in combination with nitre and tartar-emetic or tartrate of antimony, forms an efficient fever medicine in cases of high inflammation, as pleurisy and similar diseases.

The following formula for sheep has been used with success: digitalis powder, five grains; tartrate of antimony, five grains; nitrate of potass, half a drachm; water, three or four ounces. Mix. To be given twice a day.

ANTISPASMODICS.—The great antispasmodic, the great allayer of pain, and of irritation of the alimentary canal, whether in cases of diarrhœa or dysentery, is opium.

Opium.—The dose of this all-potent medicine (when judiciously administered) is two or three grains. Combined with oil, it has been given in dysentery with the best effects. Mr. D. Sayer found in certain cases of dysentery the following prescription of great service:—linseed oil, two ounces; powdered opium, two grains. Mix in an infusion of linseed.

On the following day, he gave twice in the twenty-four hours this mixture:—powdered opium, two grains; powdered ginger, and powdered gentian, of each, half a drachm. Mix in linseed tea.

Afterward this draught was repeated once a day, with the addition of half an ounce of linseed oil. This was continued for four days, when the sheep recovered. In cordial and astringent medicines, opium is an essential ingredient, and it may also be combined with aperients.

Laudanum, or Tincture of Opium.—Tincture of opium possesses the same properties as the powder of opium, but is perhaps quicker in its effects. The dose for sheep is from twenty to sixty drops.

TONICS.—It is often necessary in cases of debility, when acute diseases have been subdued, to restore or invigorate the system by tonics. Of these, gentian is the best, and, indeed, will supersede every other.

Gentian.—Powdered gentian root may be given as a tonic in doses of from half a drachm to two drachms, in combination with a scruple or half a drachm of powdered ginger in gruel or water, or in a little ale.

Cordials.—Cordials, or stimulating drenches, are not so often given to sheep as to horned cattle. The best of these cordials are ginger, caraway-seeds, essence of peppermint, and carbonate of ammonia.

Ginger.—The dose of this root in powder is from a scruple to a drachm. It is generally mixed with aperient medicines, and aids their operation.

Caraway-seeds.—Bruised caraway-seeds are useful as a cordial, though inferior to ginger. Dose, half a drachm or a drachm.

Oil or Essence of Peppermint.—Peppermint water—that is, water in which the oil of peppermint is diffused—is a good vehicle for tonic and astringent medicines. It is never given alone.

Carbonate (Subcarbonate) of Ammonia.—In cases of repletion of the stomach by a mass of undigested curd (to which lambs are subject), carbonate of ammonia may prove very useful, both from its stimulating and its antacid properties. A drench, composed of a scruple of carbonate of ammonia, two drachms of carbonate (sesqui-carbonate) of soda, half an ounce of Epsom salts, and a scruple of ginger, in warm water, may be given every six hours. A solution of potash in lime-water is recommended in these cases. We here give the directions for making and administering this solution:—take a lump of quick-lime, of the size of an egg, and pour on it, in a convenient vessel, as much water as will slake it. This being done, then pour upon it one pint of boiling water; stir the whole up, and cover close. While this is allowed to stand for some time, take an eight-ounce bottle, and put into it two ounces of subcarbonate of potass, and fill up the bottle with the lime-water already made: pouring it off rather turbid than in a state of purity. Cork this up and label it, "Solution of potass in lime-water." Of this "solution," a teaspoonful or two should be added to some warm water, together with half an ounce of salts and a scruple of ginger, and given every six hours, till good effects result. We can hardly call this a cordial medicine. Its effects, setting aside the Epsom salts, are chemical, and the same observation applies to chloride of lime given internally in cases of hoove. Its dose in the shop is about half a drachm. As a disinfectant and cleanser of foul ulcers, a solution of chloride of lime, applied externally, and used freely as a wash, is invaluable.

Chloride of Lime.—For its properties, see above. A solution of chloride of lime, for washing infected sheep-cotes, ulcers, etc., may be made with half an ounce of powder dissolved in a gallon of water. Taken inter- ly in hoove, it acts chemically as a cordial by secondary effects.

Carbonate (sesquicarbonate) of Soda.—Carbonate of soda is an antacid, and useful as a component in cordial draughts, where the correction of acidity in the stomach is desirable. Dose, about a drachm.

ASTRINGENTS.—Astringents are medicines which act upon the mucous membrane of the alimentary canal, and check diarrhœa. They consist of lime, or chalk, opium, catechu, etc., and are always combined with cordials. Of lime, or rather chalk, little need be said; it is given in doses of either half a drachm or a drachm. Of opium, we have already spoken.

Catechu.—This is an extract from a tree of the acacia tribe, and is very valuable. Dose, a scruple.

The following is a useful astringent cordial for sheep and calves:—prepared chalk, one ounce; powdered catechu, half an ounce; powdered ginger, two drachms; powdered opium, half a drachm; mucilage or gum-water, thick, two ounces; peppermint-water, six ounces. Mix. Dose: two tablespoonfuls twice a day.

Alum.—Alum is not often used in the treatment of sheep. Its dose is ten or twenty grains, according to age. The "sheep's cordial" renders it unnecessary.

EXTERNAL APPLICATIONS.—Setons are seldom used in the treatment of the diseases of sheep, and the wool prevents blisters from taking effect. With respect to chloride of lime, as we have noticed it under the head of cordials, we need not repeat our observations relative to its value as a disinfectant and cleaner of foul, sloughing fetid ulcers, when properly diluted with water (half an ounce to the gallon). The following external applications require a brief notice:—

Poultices.—Those of linseed-meal are best; it is often advantageous to mix with them a little chloride of lime, especially if they be applied to foul ulcerations. In accelerating suppuration, a little turpentine is a useful addition.

Stimulants.—Turpentine, camphorated oil, and hartshorn, form a good embrocation, useful in strains and chronic rheumatism. To two ounces of camphorated oil may be added an ounce of turpentine, and half an ounce, or even an ounce of hartshorn.

Ointments and Lotions, etc.—*Mercurial Ointment*, when rubbed down with five or seven parts of lard, forms a safe and almost certain cure for the scab. *White Lead* is often sprinkled over the part struck by the fly, in order to destroy the maggots burrowing in the skin. It is superseded by the spirit of tar, or by the coarsest kind of fish-oil. *Corrosive Sublimate.*—A dangerous remedy, often employed in solution as a wash for scab. Washes, whether of a solution of arsenic, infusion of tobacco, or of hellebore, are equally objectionable. They are superseded by the diluted mercurial ointment. *Spirit of Tar.*—A useful application in foot-rot, and very serviceable when freely applied to parts that have been struck by the fly; it not only kills the maggots, but prevents the attacks of the insects, which are repelled by its odor. *Turpentine.*—Useful as a stimulant in ointments and embrocations. It may be mixed with linseed-meal poultices, in order to hasten the suppuration of sluggish tumors, and is a serviceable application to wounds of long standing which require a stimulus.

Dressings.—Among the dressings for wounds, tincture of aloes, tincture of myrrh, and tincture of benzoin, or Friar's Balsam, are chiefly in request. Tar mixed with lard is a useful dressing in foot-rot.

Caustics.—At the head of caustics stands nitrate of silver, or lunar caustic. It is to the free use of this that the veterinary surgeon will trust in probing the wounds in cattle caused by the bite of a rabid dog. It is very useful in removing warts and cutaneous excrescences. Other caustics, however, are in requisition. In cases of foot-rot, hydrochloric acid, or a solution of bichloride of mercury, is recommended by Mr. Read, as an application to the part affected. Butyr of antimony, or chloride of antimony, is a very useful and convenient caustic. It has been employed in foot-rot, and acts well where a superficial effect only is required. It does not produce any deep corrosion; hence in indolent ulcers, in foot-rot, and in the removal of fungous excrescences, it is of important service. Verdigris, or acetate of copper, mixed with sugar of lead, finely powdered, sprinkled on sluggish ulcers, sometimes acts with good effect. Blue vitriol, or sulphate of copper finely powdered, is frequently employed as an escharotic, in order to produce superficial sloughing. A saturated solution is recommended by some veterinarians as an application of great benefit in cases of foot-rot.

Fomentations.—The great benefit resulting from fomentations arises from the warmth of the water. In cases of inflammation of the udder or garget, fomentations are indispensable. Many have an idea that the good effects of fomenting depend on the herbs which, as is generally the case, are boiled in the water; but this is an error. Poppy-heads or a little laudanum in the water may be advantageous, from the known properties of opium in allaying pain. Slight fomenting is useless—it should be long kept up; but this is seldom done, for it requires no small degree of quiet patience.

Plaisters or Charges.—Plaisters, or charges, are in frequent demand. They are useful in cases of sprain or local debility, or as a covering and protection to sores or wounds, or the basal part of fractured horns. They form a good defense in case of travel-worn feet, and in various ways are serviceable. They consist of a mixture of pitch, wax, resin, lard, etc., in different proportions, thickly spread upon coarse cloth or leather. Tar, spread upon cloth, forms an excellent plaister, especially where the main object is to exclude the air. Their application requires some little dexterity of manipulation. Tar is a useful dressing in foot-rot, when the healing process has commenced. A plaister composed of a pound of pitch and two drachms of bees' wax, melted together, and spread while warm on soft leather or linen cloth, is applied with much advantage to the heads of sheep which are sore from the ravages of the maggots of the fly. Some, as a precautionary measure, smear the head in May with this composition, and scatter a little wool over it; others sew the plaister round the head.

Salving, or Smearing.—The practice of salving or anointing the skin of the sheep, after shearing, with some unctuous preparation, is not universal. It is, however, the ordinary custom in Scotland, and is, indeed, essential to the health and comfort of sheep exposed to bleak winds in open mountain districts, to heavy mists, and drenching and long-continued rains.

The primary object of smearing is the protection of the skin from wet and cold; and next, to promote the growth of the wool and improve its character. Besides these objects, there are others not unimportant—the prevention of the attacks of insects, the destruction of such as might adhere to the skin, and the healthy action of the skin or the removal of cutaneous affections, for which tar is very efficient. Tar, mixed with butter, in order to counteract its tenacity, is the ordinary salving material; and vast quantities of damaged butter are yearly sent to the grazing districts of Scotland, for the use of the sheep farmers. One serious disadvantage, however, attends the application of tar—it indelibly stains the wool; hence it cannot be used for white goods, and what is more, it will not take the finer and more brilliant dyes. Wool thus tar-stained is termed *laid* wool, and sells at a lower ratio than *white* or *unsalved* wool. Yet in exposed situations the necessity of salving is felt, and various unguents have been tried. Instead of butter whale-oil, as an adjunct to tar, has been used, and is recommended by the Hon. W. J. Napier in his "Treatise on Practical Store-farming;" but the tinge of the tar is not obviated by this admixture. Mr. Hogg says: "Of late, several compositions have been purposely and extensively tried, in which the spirit of tar has been substituted for tar itself. This has, in some cases, been complained of as too irritating; and there is no doubt that a too free use of spirit of tar is injurious and even fatal. Some of the salves, while they prove to be perfectly well adapted to flocks that are clean, have been found ineffectual either in curing or warding off the scab—a disease which the common salve made of tar and grease seems effectually to resist. When a flock is perfectly clean, olive-oil has been found to be the best substance for softening the fleece, and warding off rain and snow. For clean sheep, 'Taylor's salve' is also suitable, though some English staplers have condemned it. If a tar-salve were made so as to be free from the impurities of the tar, it might probably answer every purpose. The ordinary proportion of one cwt. of grease to a barrel of tar, might be increased to one and a half cwt.; and when melted together, the impurities of the tar might be suffered to subside and be separated. In this way the tar might not leave a stain upon the wool when scoured. Olive oil seems to impregnate the wool, or to adhere to it more firmly than any other kind of greasy matter; and it has been successfully employed by Mr. Sellar, of Morvich, a first-rate store-farmer in Sutherland."

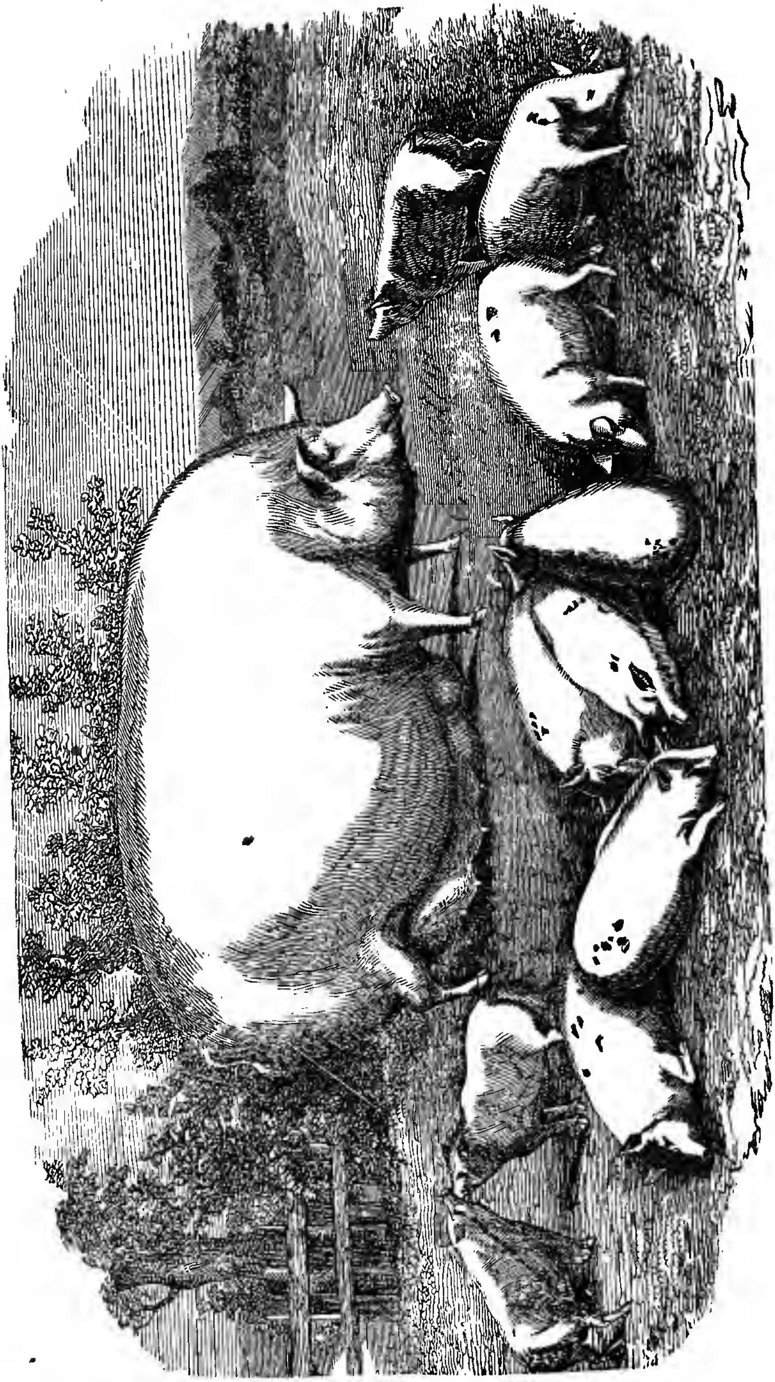
Mr. Hogg recommends the following unguent to be rubbed over every part of the animal, after shearing, with a curry brush:—train or seal oil, four gallons; tar, half a gallon; oil of turpentine, one pint. Mix. Mr. John Graham, of Newbigging, perceiving the disadvantage of tar as a wool-stainer, and yet desirous of smearing his sheep, used the following preparation, in which the tar was omitted, yellow resin being used in its stead:—butter, eighteen pounds; hogs' lard, eighteen pounds; resin, twelve pounds; Gallipoli oil, one gallon. Mix. This quantity he found sufficient for fifty or fifty-five sheep, and the cost of smearing each sheep was about four and a half pence. He found this wool, when washed, equally valuable with the *white* wool: and it sold for a considerably higher price than the *laid* or tarred wool. The importance of smearing or salving is undeniable. The use of a small quantity of some oleaginous or greasy application immediately after shearing is now generally acknowledged. The protection which it affords to the almost denuded skin—its substitution for the natural yolk, which is not in its full quantity immediately secreted—and the softness which it will impart to the wool—are circumstances well deserving attention.

THE

DOMESTIC HOG:

TO

BREED, FEED, CUT UP, AND CURE.



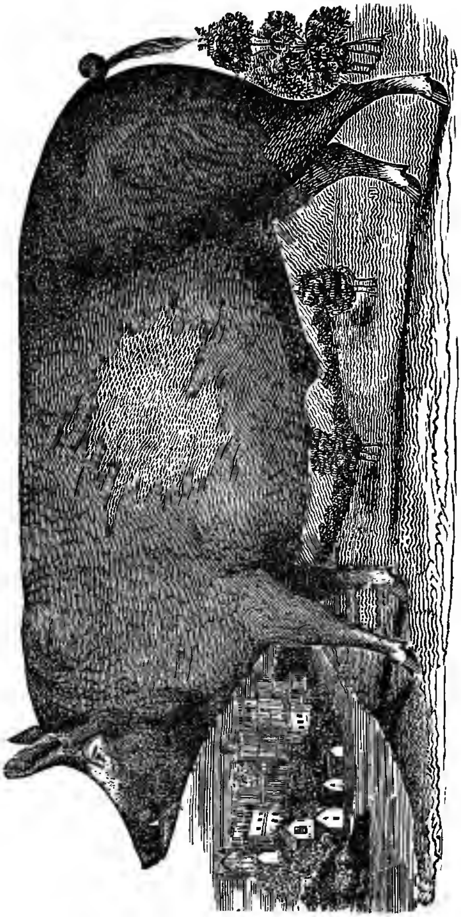
THE DOMESTIC HOG:

TO BREED, FEED, CUT UP, AND CURE.

VARIETIES OF THE HOG.—There exist only THREE actual varieties of the domestic hog—the Berkshire, Chinese, and Highland, or Irish; all other breeds, described as separate varieties, are only offshoots from one or the other of these three main stocks.

The True Berkshire Pig is black, or black and white, short-legged, full and round in the loins, rather fine in the hair, the ears small and erect, and the snout not lengthy. This description of animal forms a striking contrast with the long-sided, convex-backed, lob-eared, long-legged, and shambling brute which was common in many parts of Great Britain, and almost universal in Ireland, thirty or forty years ago, and which still, without any improvement in form, is the general description of the pig throughout France and most of Germany.

In giving preference, however, to the Berkshire breed, it is not to be understood that we consider them handsome in a positive sense, or perfect models of good breeding and propriety in their habits and manners. No dumpy animal, with its belly near the ground, with four short crutches for legs, hair by no means silky, a little curled tail, and small, sunk eyes, peering into every hole and corner and never looking upward to the glorious firmament, can be called an absolute beauty; but, compared with other races of swine, the Berkshire are handsome; and, as to their habits and manners, they have no little merit; for, considering the natural dispositions of the hog family, and the contemptuous manner in which they are spoken of and treated everywhere (except in certain parts of Ireland, and the Highlands of Scotland where pigs are privileged orders, and experience such respect as to be permitted, and even invited, to occupy the same room with their masters, by day and night, in consideration of their paying the house-rent, and supplying the means of purchasing salt, candles, and soap), the Berkshire race have unquestionable merit, and appear to respect the decencies of life. Their females have never been known to commit infanticide, as some other domesticated tribes of swine undoubtedly do, from what we consider a depraved taste; nor have either sex of this tribe been ever justly accused, or even suspected, of that cannibal propensity which has led individuals of certain other tribes of the great hog family to seize upon the tender babe in the cradle and devour it, "marrow, bones, and all!" They (the Berkshires) are so docile and gentle that a little boy or girl may drive them to and from the pasture-field or the common without having their authority disputed; and, when ranging about in the happy consciousness of liberty, though they may sometimes poke their noses where their interference is not desired, they do not perpetrate half the mischief to the turf which other classes of swine are prone to commit. They seem disposed to content themselves with the grass on the surface of the soil, without uprooting it in search of delicacies that may lie



THE BERKSHIRE HOG.

beneath, as do some of the long-snouted tribes which plow the earth up in furrows. They seem to make it a point of honor, too, to become fat as fast as possible, in return for the food they have received, in order that thus they may be in condition to pay "the pound of flesh" which is "in the bond" against them. They never fret at trifles, and thereby impede their digestion, and lose health and flesh. They never sulk and refuse their meals; nor do they complain of the quality or scantiness of their food, like some of those ungrateful children of certain parochial asylums, who have fancied that they could have eaten a little more porridge if it had been ladled into the platter for them. I do not indeed say that the Berkshire swine are singularly neat in their personal habits, quite ceremonious at their meals, and free from the vice of gluttony, nor that they will not scramble and fight for the best bits, and exhibit their unseemly manifestations of self-indulgence; nor that they would be shocked at snoring aloud, even in the presence of royalty or nobility, if the inclination to fall asleep should seize them; but, then, it is to be remembered that every individual of the hog species would do the same things. In short, their peculiarities decidedly tend to the benefit of mankind; and, after all, their failings, like many of our own, proceed entirely from the stomach.

The capacious paunch of the pig, and its great powers of digestion, are what render it so beneficial to us; yet, though in a domesticated state, a pig will eat almost any sort of animal or vegetable food—raw or cooked, fresh or putrid—he is, when at large, as naturalists inform us, the most delicate and discriminating of all quadrupeds. If free to select his vegetable food, he will reject a greater number of plants than the cow, the sheep, the horse, the ass, or the goat will refuse; so nice does he become when luxuries surround him, that in the orchards of peach-trees of North America, where the hog has delicious food, it is observed by Goldsmith, "that it will reject the food that has lain but a few hours on the ground, and continue on the watch whole hours together for a fresh windfall."

The Hampshire.—This breed is often confounded with the Berkshire, but its body is longer and its sides flatter; the head is long and the snout sharp. The color is usually dark-spotted, but sometimes altogether black, and sometimes white. This variety has been produced by crosses with the Berkshire, Suffolk, Chinese and Leicester breeds.

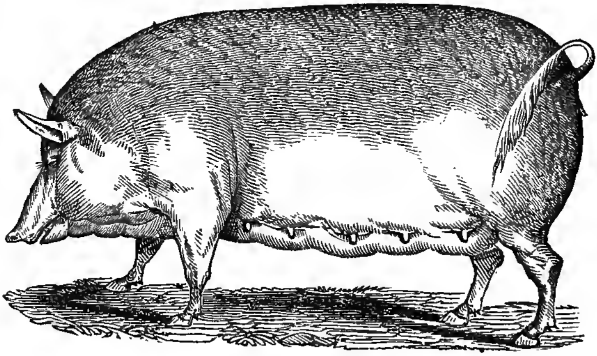
The Yorkshire.—This is the product of a cross with the true Berkshire. They are quick feeders and fatten rapidly.

Herefordshire.—Generally supposed to be the result of a cross with the Shropshire; it is shorter in the body, carries less bone than that breed, has also a lighter head, a smaller ear, a less rugged coat, and is altogether a far more valuable animal. This hog is little inferior to the Berkshire breed.

Gloucestershire.—The Gloucestershire hogs are somewhat less in size than the preceding, and are also shorter in the body, rounder both in frame and limb, and altogether more compactly built. They make good store hogs, and their pork is of prime quality.

Northamptonshire, of a light color, of a handsome shape, light and small ear, little bone, deep-sided and compactly formed. This is a profitable porker and a good store, for he feeds well, fattens rapidly, and arrives early at maturity.

Norfolk.—A small breed, with pricked erect ears; color various, but generally white. The white-colored are said to be the best; when striated or blue, the breed is inferior, at least generally so. This is a short-bodied and compactly formed pig, and is an excellent porker. There is another Norfolk variety, of larger size, spotted, but inferior in point of delicacy.



THE LEICESTER SOW.

Leicestershire.—An ancient breeding district, and once greatly celebrated for its swine. The old stock were large-sized, deep in the carcass, and flat-sided; the head and ear light and handsome, color light-spotted.

Lincolnshire.—The old Lincolnshire breed was light-colored, or even white, with, in most specimens, a curly and woolly coat, of medium size; good feeders, came early to maturity, and fattened easily.

The Essex was in former days a very capital hog, but degenerated, and, of course, lost the esteem of breeders. A recollection of the former good qualities which characterized the breed induced some persons of practical judgment to revive it, which was accordingly done; and now this hog, under the name of

The Improved Essex, ranks, most justly, very high amongst the British breeds of swine. The improvement of this hog is due to a cross with the Neapolitan; and this cross has been so frequently resorted to, that the pure Essex breed and the Neapolitan are so much alike that it is not every cursory observer who is capable of discriminating between them. It is probable, also, that the Chinese was employed in the regeneration. The Essex hog is up-eared; has a long, sharp head; also a long and level carcass, with small bone; color most frequently black, or black and white. This is a quicker feeder, but he requires a greater proportion of food than the weight he attains to justifies; besides which, he is troublesome in a fold, being restless and discontented. The pure breed should be almost bare of hair, and black in color.

There is another improved Essex breed called the *Essex half-blacks*, resembling that which we have described, in color, said to be descended from the Berkshire. This breed was originally introduced by Lord Western, and obtained much celebrity. They are black and white, short-haired, fine-skinned, with smaller heads and ears than the Berkshire, feathered with inside hair, a distinctive mark of both; have short, snubby noses, very fine bone, broad and deep in the belly, full in the hind quarters, and light in the bone and offal. They feed remarkably quick, grow fast, and are of an excellent quality of meat. The sows are good breeders, and bring litters of from eight to twelve, but they have the character of being bad nurses.

The Sussex.—Black and white in color, but not spotted, that is to say, these colors are distributed in very large patches; one-half—say, for instance, the fore-part of the body—white, and the hinder end black; sometimes both ends black, and the middle white, or the reverse. These are no way remarkable; they seldom feed over one hundred and sixty pounds.

The Chinese Hog.—This breed is of small size, yet its early maturity, the rapidity with which it takes on flesh, and the smallness of its bones, have induced many breeders to use it in crosses with larger and coarser breeds—one of the best results of which has been the production of a very popular variety, denominated *The Suffolk.*

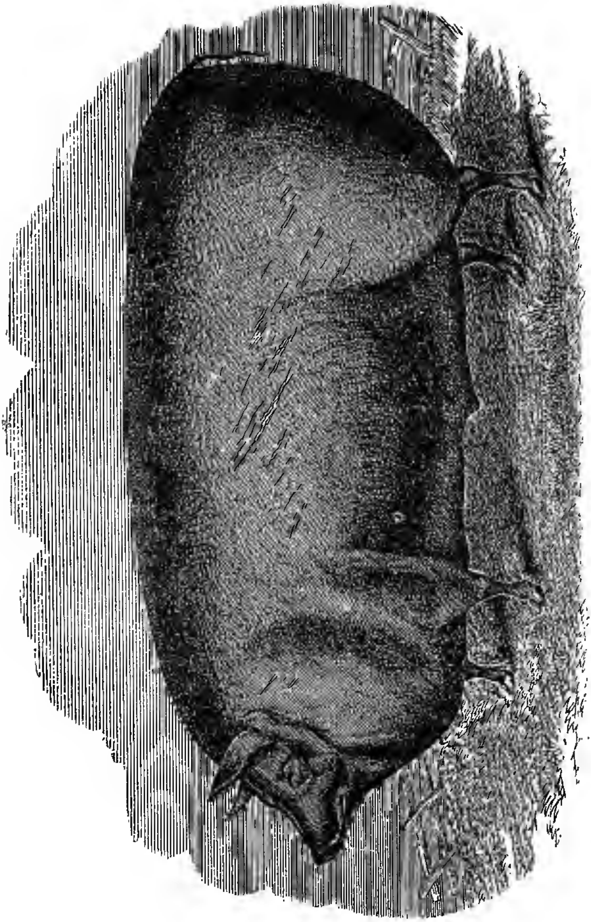
The Suffolk Hog.—The Suffolk breed of swine are a small, delicate pig, thin-skinned, soft-haired, small, pricked ear; color white. They are in character like the Chinese, fed almost as easily, are more hardy, and possess more lean meat.

HOW TO CHOOSE A PIG.—How to choose a pig?—that is the question. To rely on the terms Berkshire, Essex, Suffolk, Improved Yorkshire, Improved Bedfordshire, etc., as guarantees of first-rate qualities, would be folly. In all countries, even those the most renowned for their breeds, there are both good and bad; and even of the best breeds some are inferior to the others, and ought to be rejected as unfit for becoming the parents of a lineage.

The following, the result of large and recent experience, are well worthy the attention of breeders:

Fertility.—The strain from which the farmer or breeder selects ought to be noted for fertility. In a breeding sow this quality is essential, and it is one which is inherited. The same observation applies to other domestic animals. But, besides this, she should be a careful mother, and with a sufficient number of dugs for a family of twelve at a single litter. A young untried sow will generally display in her instincts those which have predominated in the race from which she has descended; and the number of teats can be counted. Both boar and sow should be sound, healthy, and in fair but not over-fat condition; and the former should be from a stock in which fertility is a characteristic.

Form.—It may be that the farmer has a breed which he wishes to perpetuate; it is highly improved, and he sees no reason for immediate crossing. But, on the other hand, he may have an excellent breed with certain defects—as too long in the limb, or too heavy in the bone. Here, we should say, the sire to be chosen, whether of a pure or cross breed, should exhibit the opposite qualities, even to an extreme, and be, withal, one of a strain noted for early and rapid fattening.



IMPROVED CHINESE HOG.

But what is meant by *form*, as applied to the pig? A development of those points connected with the profit of the owner. In these points high or low blood is demonstrated. The head should be small, high at the forehead, short and sharp in the snout, with eyes animated and lively, and thin, sharp, upright ears; the jowl, or cheek, should be deep and full; the neck should be thick and deep, arch gracefully from the back of the head, and merge gradually into a broad breast; the shoulders should be set well apart at the clavicular joint; the body should be deep, round, well-barreled, with an ample chest, broad loins, and a straight, flat, broad back; the tail should be slender; the hams should be round, full, and well developed; the limbs fine-boned, with clean, small joints; and with small, compact hoofs, set closely together, with a straight bearing upon the ground. If in perfect health, the animal will be lively, animated, hold up his head, and move freely and nimbly. We do not speak of fat hogs, for they are necessarily sluggish and unwieldy; nor yet of pregnant sows; but of young store-hogs, or of young stock selected for breeding.

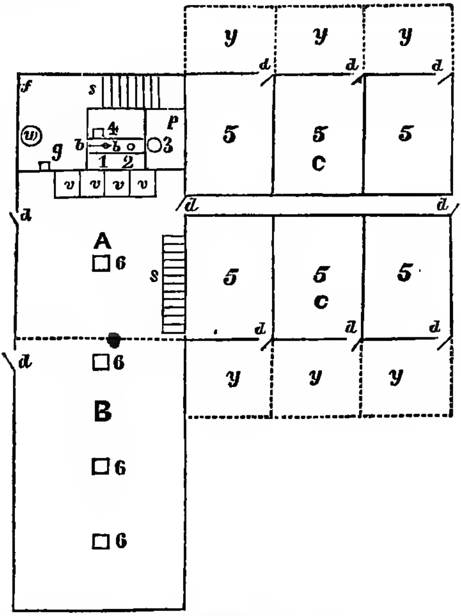
The *skin* should be soft and thin, of a bright pink color; the neck short, the chest wide (which denotes strength of constitution); broad, straight back, short head, and fine snout, slightly curved upward; and in the large breed there is often a pretty prominent swelling on the snout, between the nasal and frontal bones. The legs and hoofs should be small. The sows should have at least twelve teats. In purchasing a prize animal, whether boar or sow, see that it can walk well. A lump of fat bacon may do to kill at Christmas, but will be of very little use until reduced to breed from; and in the journey and reduction you may lose your pig and your money.

For breeding sucking-pigs there is nothing better than the large English breed (they are prolific, and good mothers), crossed with a white Chinese boar. No other breed will raise sucking-pigs to the same size as this cross; they also form excellent porkers, speedily attaining from forty-eight to fifty-six pounds; but if required to be much larger, it will be found to pay better to treat them as stores, letting them graze, or run as "shocks" in the field after harvest, or rooting on the manure-heap, until they are ten or twelve months old, and then put them up to fatten. Still they are not so profitable as the improved Essex, and do not make such fine bacon as the improved Berkshire.

The improved Essex, if well fed from the first, arrives very early at maturity, as to its frame or bony structure, and is the best for making hobbledehoys of porkers from eighteen to twenty pounds' weight.

The improved Berkshire may be considered the more useful to a farmer who desires a sort useful in every stage of its growth. The Berkshire sow will suckle ten or a dozen sucking-pigs—even more if assisted by artificial means—and is very superior for large ham and bacon. The small breed is very well for porkers, but not for the flitch. A good little animal is good; but we want a good and big animal. The improved Berkshire realizes this desideratum, as it realizes the highest price from the bacon-curers, cuts up wide over the back, well interlarded with fat and lean. It is also more free from lameness than any other breed.

In a word, in choosing a pig, you must consider your climate, your means of feeding, and your market; whether you want sucking-pigs or hobbledehoy pork..



PIGGERY.

A, A, front; C, C, rear for pens; 5, 5, pens with alley between; *v*, *v*, *v*, *v*, vats on level with pens; 1, safety valve; 2, steam pipe; 3, supply barrel to boiler; *b*, boiler; *f*, furnace; *p*, platform partly over boiler; 4. chimney; *t*, drain; *w*, water-cistern; *g*, door to cellar; *s*, *s*, stairs; *d*, *d*, doors; 6, 6, scuttles to cellar; *y*, *y*, yards to pens.

HOUSES AND PIGGERIES.—An inclosure proportionate to the number of swine which you intend to keep, and, if possible, so managed as to admit of extending the accommodation, will be found the best for general purposes. It should be provided with a range of sheds, so situated as to be thoroughly sheltered from wind and weather, paved at the bottom, and sloping outward. Relative to the paramount necessity of cleanliness and dryness, let both inclosure and sheds possess the means of being kept so. In order to keep the sheds, which are designed as sleeping places, in a dry and clean state, an inclination outward is necessary; a shallow drain should run along the whole of their extent, in order to receive whatever wet flows down the inclined plane of the sleeping huts; and provision should also be made for this drain to carry off all offensive matters beyond the precincts of the piggery.

The ground on which the piggery is established should likewise be divided into two parts, by a drain, which should run through it; and toward this drain each section should slope. This the main drain should be carried beyond the fold, and fall into a large tank or pit formed for that purpose. The object in view is to keep the pig-fold and sties in a clean and dry state, and to preserve the valuable *liquid manure*, which comes from the animals you keep. Some will probably inquire whether it would not be better to suffer the moisture to soak into earth or straw, or other substances on the *floor* of the inclosure, and then to clear all away periodically, than to drain off the liquid into a tank. By drawing off the liquid you add to the cleanliness of your swine, and, in proportion, to their health and capacity for thriving; and the collection of the liquid manure into tanks is less troublesome than the removal of substances saturated with it, from the floor of the fold, would be.

The sties should be so constructed as to admit of being closed up altogether, when desirable; for swine, even the hardiest breeds, are susceptible of cold, and if exposed to it in severe weather, it will materially retard their fattening. The sty should be kept constantly supplied with clean straw. The refuse carted into the tank will, in the form of manure, more than repay the value of the straw. It has been asserted that swine do not thrive if kept upon the same ground in considerable numbers; this assertion rests on a want of ventilation and cleanliness.

As to *troughs*, let them be of stone or cast metal;—if of wood, the pigs will soon gnaw them to pieces;—and let them be *kept clean*. Before each feeding, a pail of water should be dashed into the trough; this may be deemed troublesome, but it will confer *golden returns* on those who attend to it.

A supply of fresh water is essential to the well-being of swine, and should be freely furnished. Some recommend this to be effected by having a stream brought through the piggery; and undoubtedly, when this can be managed, it answers better than any thing else. Swine are dirty feeders, and dirty drinkers, usually plunging their fore-feet into the trough or pail, and thus polluting with mud and dirt whatever may be given to them. One of the advantages, therefore, derivable from the stream of running water being brought through the fold is, its being, by its running, kept constantly clean and wholesome. If, therefore, you are unable to procure this advantage, it will be desirable to present water in vessels of a size to receive but one head at a time, and of such height as to render it impossible or difficult for the drinker to get his feet into it. The water should be renewed twice daily.

We have hitherto been describing a piggery capable of containing a large number; a greater proportional profit will be realized by keeping a number of swine than a few. It may happen, however, that want of capital, or of inclination to embark in swine-feeding as an actual speculation, may induce many to prefer keeping a small number of pigs, or even perhaps one or two, in which case such accommodations as have been described would be more than superfluous. In this case, a single hut, well sheltered from wind and rain, and built with a due regard to comfort, to warmth, with a little court surrounding its door, in which the tenant may feed, obey the calls of nature, and disport himself, or bask in the sunshine, will be found to answer; a small stone trough, or a wooden one, bound with iron, to preserve it from being gnawed to pieces, will complete the necessary furniture. The trough will serve alternately for food and drink. Even, however, when this limited accommodation is resorted to, a strict attention to cleanliness is no less necessary than when operations are carried on on the most extensive scale. Both the floor of the hut and that of the little court should be paved, and should incline outward; along the lowest side should be a drain, with a sufficient declination, and so contrived as to communicate with your dung-tank. The farther the manure-heap, or tank, from the dwelling, the better: vegetable matter, in progress of decomposition, gives rise to pestilential vapors, or miasmata.

When the weather is fine, a few hours' liberty will serve the health and the condition of your hog, and a little grazing would be all the better. Should you be desirous of breeding, and keep a sow for that purpose, you must, if you have a second hog, provide a second sty, for the sow will require a separate apartment when heavy in pig, and when giving suck. This may be easily effected by building it against that which you have already erected, thus saving the trouble of raising more walls than are absolutely necessary; and it need not have a court attached to it, should it be inconvenient for you to have one, as the best accommodation can be given up to the breeding sow, and your pigs will do well enough with a single apartment, if not too confined, and it have sufficient ventilation; and if you permit them the advantage of taking air for a few hours daily. The extensive feeder should have a boiler of large size, properly fitted up, and an apparatus for steaming, as some vegetables are cooked in this mode more advantageously than by boiling. The poor man can use a pot as a substitute for a boiler, remembering in every case to clean it before using. Food should be presented to swine in a warm state—neither too hot nor too cold.

A sty should be about seven or eight feet square, and the court about ten feet. The second sty need not be more than six feet square, and does not absolutely require a court.

Breeding, Rearing, and Feeding.—In the selection of a boar and sow for breeding, much more attention and consideration are necessary than people generally imagine. It is as easy, with a very little judgment and management, to procure a good as an inferior breed; and the former is infinitely more remunerative, in proportion to outlay, than the latter can possibly ever be. In selecting the parents of your future stock, you must bear in mind the precise objects you may have in view, whether the rearing for pork, or bacon; and whether you desire to meet the earliest market, and thus realize a certain profit, with the least possible outlay of money, or loss of time; or whether you mean to be contented to await a heavier although somewhat protracted return. If bacon, and the late market be your object, you will do well to select the large and heavy varieties, taking care that the breed has the character of being possessed of those qualities most likely to insure a heavy return, viz.: *growth* and *facility* of taking fat, relatively possessed by each. To that description we refer the reader. If his object be to produce pork, he will find his account in the smaller varieties; such as arrive with greatest rapidity at maturity, and which are likely to produce the most delicate flesh. In producing *pork*, it is not desirable that it should be *too fat*, without a corresponding proportion of lean; and on this account, rather take a cross-bred sow than a pure Chinese stock, from which the over-fattening results might most naturally be apprehended. The Berkshire, crossed with Chinese, is about the best porker I can mention. In every case, whether your object be pork or bacon, the *points* to be looked for are—in the sow, a small, lively head, a broad and deep chest, round ribs, capacious barrel, a haunch falling almost to the hough, deep and broad loin, ample hips, and considerable *length* of body in proportion to *height*. One qualification should ever be kept in view, and, perhaps, should be the first *point* to which the attention should be directed, viz., *smallness of bone.*

Let the boar be less in size than the sow, shorter and more compact in form, with a raised and brawny neck, lively eye, small head, firm, hard flesh, and his neck well furnished with bristles—in other respects seek the same points we have described in reference to the sow. Breeding within too close degrees of consanguinity, or, *breeding in and in*, is calculated to produce degeneracy in size, and also to impair fertility; it is therefore to be avoided, although some breeders maintain that a *first cross* does no harm, but on the contrary, that it produces offspring which are disposed to arrive earlier at maturity. This may in some instances be the case; it is so with horned cattle, but as far as swine are concerned, it is not my own experience.

Differences of opinion exist as to the precise age of boar and sow, at which breeding is most advisable. They will, if permitted, breed at the early age of six or seven months; but this is a practice not to be recommended. My advice is, to let the sow be *at least* one year old, and the boar *at least* eighteen months; but, if the former has attained her second year, and the latter his third, a vigorous and numerous offspring are more likely to result. The boar and sow retain their ability to breed for about five years, that is, until the former is upward of eight years old, and the latter seven. I do not recommend using a boar after he has passed his fifth year, nor a sow after she has passed her fourth, unless she has proved a peculiarly valuable breeder; in which case, she might be suffered to produce two or three more litters. When you are done with the services of the boar, have him emasculated—an operation that can be performed with perfect safety at any age—fatten or sell him. When it is no longer desirable to breed from the sow, kill her. Before doing so, it is a good plan to put her to the boar, as she takes fat afterward more rapidly than she otherwise would.

If a sow be of a stock characterized by an unusual tendency to take fat, it is well to breed from her at an unusually early age—say eight or nine months; for this tendency to fat, in a breeding sow, is highly objectionable, as conducing to danger in parturition. Let her have the boar a couple of days after pigging, and let her breed as frequently as she is capable of doing. This will effectually check the tendency to fat; and, after having taken a few litters from her, you will find the rapidity with which, should you desire her for the butcher, she will take flesh quite extraordinary. In the case of such a sow, do not give the boar before putting her up to fatten.

Feed the breeding boar well; keep him in high condition, but not fat; the sow, on the other hand, should be kept somewhat low, until after conception, when the quantity and quality of her food should be gradually increased. The best times for breeding swine are, the months of March, and July or August. A litter obtained later than August has much to contend with, and seldom proves profitable; some, indeed, state that when such an occurrence does take place, whether from accident or neglect, the litter is not worth keeping. It is little use, however, to throw any thing away. Should the reader at any time have a late litter, let him leave them with the sow; feed both her and them with warm and stimulating food, and he will thus have excellent pork, with which to meet the market, when that article is at once scarce and dear, and consequently profitable. By following this system of management, he will not only turn his late litter to account, but actually realize most as good a profit as if it had been produced at a favorable season.

The period of gestation in the sow varies; the most usual period during which she carries her young, is four lunar months, or sixteen weeks, or about one hundred and thirteen days. M. Teissieur, of Paris, a gentleman who paid much attention to this subject, in connection not merely with swine, but other animals, states that it varies from one hundred and nine to one hundred and forty-three days; he formed his calculation from the attentive observation of twenty-five sows.

The sow produces from eight to thirteen young ones at a litter, sometimes even more. Extraordinary fecundity, is, however, not desirable, for a sow cannot give nourishment to more young than she has teats for, and, as the number of teats is twelve, when a thirteenth one is littered, he does not fare very well. The sufferer on these occasions is of course the smallest and weakest; a too numerous litter are all indeed generally undersized and weakly, and seldom or never prove profitable; a litter not exceeding ten, will, usually, be found to turn out most advantageously. On account of the discrepancy subsisting between the number farrowed by different sows, it is a good plan, if it can be managed, to have more than one breeding at the same time, in order that you may equalize the number to be suckled by each. The sow seldom recognizes the presence of a strange little one, if it has been introduced among the others during her absence, and has lain for half an hour or so among her own offspring in their sty.

While the sow is carrying her young, feed her abundantly, and increase the quantity until parturition approaches within a week or so, when it is as well to diminish both the quantity and quality. While she gives suck you cannot feed her too well. You may wean the young at eight weeks old, and should remove them for that purpose from the sow; feed them well, frequently, abundantly, but not to leaving, and on moist, nutritious food, and pay particular attention to their lodgment—a warm, dry, comfortable bed is of fully as much consequence as feeding, if not even of more. Should the sow exhibit any tendency to devour its young, or should she have done so on a former occasion, strap up her mouth for the first three or four days, only releasing it to admit of her taking her meals. Some sows are apt to lie upon, and crush heir young. This may be best avoided by not keeping the sow too fat or heavy, and by not leaving too many young upon her. Let the straw forming the bed also be short, and not in too great quantity, lest the pigs get huddled up under it, and the sow unconsciously overlie them in that condition.

The young pigs should be gradually fed before permanently weaning them; and for first food, nothing is so good as milk, which may be succeeded by ordinary dairy wash, thickened with oat or barley-meal, or fine pollard; this is better scalded, or, better still, boiled. To the sow, some dry food should be given once daily, which might consist of pease, beans, Swedish turnips, carrots, parsnips, or the like, either well boiled or raw; but I prefer the food to be *always* boiled, or, what is still better, *steamed*. Some wean the pigs within a few hours after birth, and turn the sow at once to the boar. Under certain circumstances, this may be found advantageous; but I think that the best mode of management is to turn the boar into the hog-yard about a week after parturition, at which time it is proper to remove the sows for a few hours daily from their young, and let them accept his overtures when they please. It does not injure either the sow or her young if she take the boar while suckling, but some sows will not do so until the drying of their milk.

Castration and Spaying should only be performed on such as you intend to keep, as you do not know what a purchaser's wishes on the subject might be. It is, of course, unnecessary for me to give any directions as to the mode of performing this operation, as no amateur should attempt it; and men who make the practice their means of livelihood are, in every district, not difficult to be got at, or exorbitant in their terms. The sow is, if desirable, to be spayed while suckling; the boar, as we have already stated, may be castrated at any age with perfect safety.

Ringing.—At weaning time, ring the young pigs. This operation must be a painful one, but scarcely so much so as the little sufferers would seem to indicate. Ringing is, however, absolutely necessary, unless the cartilage of the nose be *cut away*, a practice resorted to in substitution for it in some parts of England; the latter practice is, however, far more cruel than ringing, and its efficacy is by many stated to be at the best questionable.

After about five weeks' high and careful feeding subsequent to weaning, the young pigs may be put up for stores, porkers, etc., according to your views respecting them. Very young pigs, immediately after being weaned, if fed on the refuse of a dairy, will be brought up for delicious pork in five or six weeks; for the last week prior to killing, the addition of grains or bruised corn will impart a degree of firmness to the flesh, that is considered an improvement. This is called "dairy-fed pork," and it never fails to fetch an enhanced price, thereby amply remunerating its producer.

Hogs designed for pork should not be fattened to the same extent as those designed for bacon. We are aware that it will be vain for us to request the reader not to do so, as fat produces weight—weight, profit—and profit is the object of the feeder. But to those who feed for home consumption, we urge the suggestion, and they will find their account in following it. Porkers should be suffered to run at large. Grazing, or the run of a wood in which roots or nuts may be met with, is calculated in an eminent degree to improve the quality of their flesh. It will be necessary to give the hogs regular meals, independent of what they can thus cater for themselves; and the hours for so doing should be in the morning, before they are let out, and in the evening, before they are returned to the sty. Too many swine should not be kept in one sty; and if one become an object of persecution to the rest, he should be withdrawn. The introduction of strangers should likewise be avoided. Bacon hogs fatten best by themselves; they need no liberty; and it is only necessary to keep the sty dry and clean, and to feed abundantly, in order to prepare them for the knife. In order to fatten a hog, his *comforts* must in every respect be attended to.

Those who make pork-feeding a business, and consequently keep a number of these animals, should so manage as to be enabled to provide for their maintenance and fattening from the produce of their crops. They should therefore raise the potato, beans, pease, barley, buckwheat, flax, parsnips, carrots, cabbage, lettuce, Lucerne, Italian rye-grass, clover, rape, chiccory, and vetches. Nor are we to forget the important articles, mangold and Swedish turnips; the latter especially, as being an article that sad necessity has recently, for the first time, brought into the full degree of notice it has always deserved; and an article that is now found to be no less valuable for human food than it is admitted to be for the food of cattle.

The best possible mode of feeding hogs is with a mixture of two or more of the roots or plants enumerated, well steamed, and a little meal or bran added, or, instead of meal or bran, add brewer's grains, wash, half-malted barley, pollard, etc. Let these be well boiled and given moderately cool, and in a moist state.

The advantages derivable from the use of hay-tea in store-feeding hogs was, I think, for the first time demonstrated to the public, some years ago, by Mr. Saunders, of Stroud, in Gloucestershire. Mr. Saunders was induced to try this diet with hogs, from an observation of its efficacy in weaning calves; his experiments were attended with the most unqualified success.

The use of flax-seed, as an addition to the other food for fattening swine, has been recommended, but is found not to answer nearly so well in the crude state as previously kiln-dried, and well crushed, so as to crack the seed; otherwise the animal will pass a large proportion of the seed in a whole state; the whole seed acts as a purgative and diuretic, which will be opposed to the secretion of fat. To prepare the seed for food, steep them for twelve hours in water, which may be poured on them in a tepid state, but not at boiling heat; and, prior to giving the mess, add as much lukewarm wash as will bring it to the consistence of gruel. This wash may be produced from brewers' grains, or simply from mangold or Swedish turnips, well boiled and mashed, and given with the water in which they have been boiled; the addition of a proportion of bran improves the mess, and, when one has it, it should not be omitted.

The adoption of hay-tea as the vehicle for mixing these ingredients, will be found also advantageous. Do not boil the flax-seed—boiling will produce a coarse, tough, and not very digestible mass; but steeping, on the contrary, furnishes a rich and nutritious jelly. Linseed cake is a good substitute for the seed, and is to be given in a proportion of fourteen pounds for seventeen or eighteen pounds of ground seed Neither should be given, except in combination with a large proportion of other substances, as they are of a very greasy nature, and are apt to impart a rank flavor to flesh, if given in an unmixed state, and are actually more efficacious in combination. If you have plenty of meal, the addition of a little to the daily feeds will be found to tell well, especially toward the close of fattening, a few weeks previous to transferring your stock to the butcher.

The refuse of mills forms a very valuable item in swine food, when mixed with such boiled roots as I have enumerated—as starch sounds, the refuse from the manufacture of that article; also the fibrous refuse remaining from the manufacture of potato-starch.

Swine are frequently kept by butchers, and are fed principally upon the garbage of the shambles—as entrails, the paunches, lights, and the viscera of sheep and cattle, as well as the blood. Swine are, like their human owners, omnivorous, and few articles come amiss to them. It must, nevertheless, be confessed, that the flesh of hogs fed on animal food is rank both in smell and taste, and readily distinguishable from that produced from a vegetable diet. I am not unnecessarily prejudiced, and it is on the merits of the case alone that I condemn butcher-fed pork. Pork butchers, resident in large towns, are very apt to feed chiefly on offal of all sorts, including that arising from the hogs daily slain and dressed for the market.

There is yet another description of feeding—I allude to the feeding of swine in knackers' yards. The animals are kept in considerable numbers, and are fed wholly upon the refuse of dead horses—chiefly the entrails, the carcass being in too great demand among those who keep dogs to permit of it being unnecessarily wasted. Nor are these horses always fresh, the swine reveling in corruption, and disputing with the maggot the possession of a mass of liquid putrefaction. And are we to say nothing of the number of horses who die of glanders, farcy, or some similarly frightful contagious and incurable disorder? How can we be certain that this is not one of the many sources whence occasionally spring apparently causeless pestilences or malignant epidemics? While such a practice is tolerated, with what caution should we not purchase bacon or pork, lest we should thus eat at second-hand of substances so revolting to the feelings, so dangerous to individual and public health!

Chandlers' Greaves are likewise objectionable as food for swine, unless given in comparatively small quantities, and mixed with bran, meal, and boiled roots. If fed wholly on either greaves, or oil-cake, or flax-seed, the flesh becomes loose, unsubstantial, and carriony; and gives out a flavor resembling that of rancid oil.

Hogs that have been fed chiefly on corn, alternated with the vegetable diet already described, produce pork nearly equal in delicacy of flavor, whiteness of color, and consequent value, to that well-known, delicious article, DAIRY PORK. Indian corn is most useful in feeding and in fattening pigs; it should be employed in conjunction with oat or barley meal, or some other equally nutritious matter.

Respecting the quality of food, vast numbers of bacon hogs are almost invariably fed upon potatoes; but however apparently satisfactory may be their weight and condition, yet, when slaughtered immediately, or before having several weeks of substantial food, to harden their flesh, they are always found inferior to corn-fed pork and bacon, the fat having a tallowy appearance, of an insipid taste, and shrinking for want of firmness; whereas, when boiled, it should be transparently hard, with a tinge of pink in its color; the flavor should be good, and the meat should swell in the pot. Potatoes, therefore, though fine food for stores, should never be used alone as sustenance in the fatting of bacon hogs; for, in proportion to the quantity employed, it will render the flesh and consequently the price, inferior to that of hogs which have been properly fed. They are, however, frequently employed, when steamed, in conjunction with either tail or stained barley, coarsely ground; and farmers who grow potatoes for the market may thus profitably dispose of the chats along with their unmarketable corn; but those persons who wish to acquire a reputation for producing fine bacon, should never use any thing for fatting but hard meat, together with skim-milk, if it can be procured.

When swine are not of very large size, and it is desirable to raise pork rather than bacon, a very economical mode of feeding may be advantageously employed.—it consists of equal parts of boiled Swedish turnips or potatoes, and bran. If it be desirable to render the accumulation of fat more rapid, let Indian meal be substituted for the bran, and in flax-growing countries, the seed prepared as already directed.

A hog washed weekly with soap and a brush will be found to thrive, and put up flesh in a ratio of at least five to three, in comparison to a pig not so treated. This fact has been well tried, there can be no possible question about its correctness, and the duty is not a very difficult matter to perform, for the swine, as soon as they discover the real character of the operation, are far from being disposed to object, and after a couple of washings, submit with the best grace imaginable.

Beware not to Surfeit your hogs. It is quite possible to give too much even to them, and to produce disease by over-feeding.

Many examples of great weights, produced by judicious feeding and management, are upon record. Mr. Crockford's Suffolk hog, at two years old, weighed nine hundred and eighty pounds; but I scarcely think it could have been true Suffolk, that being a small breed. Mr. Ivory's Shropshire hog weighed fourteen hundred, when killed and dressed, and there was, a short time since, a specimen of the improved Irish breed of hog exhibited in Dublin, at the Portobello Gardens, which weighed upward of twelve hundred weight; this, when killed, would have amounted to something over half a ton.

In conclusion, observe caution in conjunction with the directions already given relative to feeding.

1. Avoid foul feeding.
2. Do not omit adding salt in moderate quantities to the mess given; you will find your account in attending to this.
3. Feed at regular intervals.
4. Cleanse the troughs previous to feeding.
5. Do not over-feed; give only as much as will be consumed at the meal.

6. VARY YOUR BILL OF FARE. Variety will create, or, at all events, increase appetite, and it is further most conducive to health; let your variations be guided by the state of the dung cast; this should be of medium consistence, and of a grayish-brown color; if hard, increase the quantity of bran and succulent roots; if too liquid, diminish, or dispense with bran, and let the mess be firmer; if you can, add a portion of corn—that which is injured, and thus rendered unfit for other purposes, will be found to answer well.

7. FEED YOUR STOCK SEPARATELY, in classes, according to their relative conditions; keep sows in young by themselves; stores by themselves; and bacon hogs and porkers by themselves. It is not advisable to keep your stores too high in flesh, for high feeding is calculated to retard development of form and bulk. It is better to feed pigs intended to be put up for bacon, loosely, and not too abundantly, until they have attained their full stature; you can then bring them into the highest possible condition in an inconceivably short space of time.

8. DO NOT REGRET THE LOSS OR SCARCITY OF POTATOES, so far as swine-feeding is concerned. Its loss has been the means of stimulating inquiry and producing experiment, which has resulted in the discovery that many other superior vegetables have been hitherto neglected and foolishly passed aside.

9. DO NOT NEGLECT TO KEEP YOUR SWINE CLEAN, DRY, AND WARM. These are essentials, and not a whit less imperative than feeding, for an inferior description of food will, by their aid, succeed far better than the highest feeding will without them; and we would reiterate the benefit derivable from washing your hogs; this will repay your trouble manifold.

10. WATCH THE MARKETS. Sell when you see a reasonable profit before you. Many and many a man has swamped himself by giving way to covetousness, and by desiring to realize an unusual amount of gain; recollect how very fluctuating are the markets, and that a certain gain is far better than the risk of loss.

Time Requisite for Feeding Fat—Quantity of Food.—This will, of course, vary very considerably, according to the weight, age, breed, and condition of the store when first put up, as well as the description of food on which, up to that period, the animal has been fed. The same observations are applicable to the quantity of food required for the production of fat.

If a young store, five or six weeks may be sufficient; if older, six or eight; and if of the mature age, intended for a perfect bacon hog, of that moderate degree of size and fatness which is preferred for the general consumption of the middle classes, from twelve to fourteen. A bacon hog, if intended to be thoroughly fattened for farm use, should, however, be of a large breed, and brought to such a state as not to be able to rise without difficulty, and will, perhaps, require five or six months, or even more, to bring him to that condition. This, however, supposes him to be completely fat; to ascertain which with perfect accuracy, he ought to be weighed every week during the latter part of the process; for although his appetite will gradually fall off as he increases in fat, yet the flesh which he will acquire will also diminish until at last it will not pay for his food, and he should then be immediately slaughtered.

The Chemestry of Pig-Feeding.—In 1851-2, with the view of ascertaining, among other points, the comparative value of various kinds of food used for fattening pigs, Mr. J. B. Lawes, of Rothamsted, Herts, the eminent chemist and manufacturer of super-phosphate of lime, undertook a series of experiments on a large scale, recorded in a paper illustrated by a series of elaborate tables, which occupy upwards of eighty pages of the fourteenth volume of the "Journal of the Royal Agricultural Society." This paper, of the highest possible value to the scientific agriculturist, few plain farmers or fancy pig-feeders would have the courage to read, or would be able fully to understand, if they did. We shall, therefore, endeavor to give the results briefly and plainly; they fully confirm the opinions of the most successful pig-feeders.

The food employed in these experiments was composed as follows:—1. Equal weights of beans and lentils; 2. Indian corn; 3. Bran. The food was accurately weighed; and the animals were put into the scales every fourteen days.

For the first series of experiments, forty animals, as nearly as possible of the same character, and age about ten months, were purchased, and divided into twelve pens of three pigs each, and were all fed alike for twelve days, changed from pen to pen, and the unruly ones whipped, so as to put down the tyrants and enable them all to start fair in the feeding race for weight. When fairly started, twelve dietaries were prepared from three standard food-stuffs, arranged as follows:—1. Bean and lentil mixture, an unlimited allowance; 2. Two pounds of Indian corn per pig per day, and an unlimited allowance of the beans and lentils; 3. Two pounds of bran per pig per day, and beans and lentils unlimited; 4. Two pounds of Indian corn, two pounds of bran, and the bean and lentil mixture unlimited; 5. Indian corn alone, unlimited; 6. Two pounds of beans and lentils, and unlimited Indian corn allowance; 7. Two pounds of bran per day, and unlimited Indian corn allowance; 8. Two pounds of bean and lentil mixture, two pounds of bran, and Indian corn unlimited; 9. Two pounds of bean and lentil mixture, and bran unlimited; 10. Two pounds of Indian corn-meal, and bran unlimited; 11. Two pounds of bean and lentil mixture, two pounds of Indian corn, and bran unlimited; 12. Bean and lentil mixture, Indian corn-meal and bran, each separately and unlimited.

This food was duly mixed with water. The animals were fed three times a day; viz., early in the morning, at noon, and at five o'clock in the evening. The limited food was mixed with a small quantity of that given *ad libitum* in the first two feeds of the day. Great care was taken in the management of the supply of food, both that the troughs should generally be cleared out before fresh food was put into them, and that the pigs should always have a liberal supply within their reach.

In one of the pens two of the pigs having become unwell from large swellings in their necks, which affected their breathing, a mixture was prepared, consisting of twenty pounds of finely-sifted coal-ashes, four pounds of common salt, and one pound of super-phosphate of lime, and placed in a trough. The pigs devoured it with eagerness; and, from this time, the tumors began to diminish, and entirely disappeared in six weeks. Three pigs consumed nine pounds in the first fortnight, six pounds in the second, and nine pounds during the third.

Three sets of pigs, each divided into twelve pens of three pigs each, were devoted to three series of experiments, with the various quantities of the food mentioned; in one series barley-meal taking the place of Indian corn, and the third series being devoted to the trial of dried Newfoundland codfish—an article which could be supplied in large quantities at a moderate price, in connection with the other food named. The amount given varied from one to two pounds of codfish per day. It was in all cases boiled, and a portion of other food mixed with the soup thus obtained.

The following are the more simple of the conclusions at which Mr. Lawes arrived: Indian corn or barley-meal with a limited supply of bran is very good food, the bran adding to the value of the manure. Where the pigs had unlimited access to three kinds of food, viz., the highly nitrogenous pulse mixture, the non-nitrogenous Indian meal, and bran, which is moderately nitrogenous—they gradually discontinued the proportion of their consumption of the first, as they approached maturity, and throughout only consumed five per cent. of bran. The average consumption of corn per pig per week was sixty pounds, or about nine pounds per day, which produced ten to twelve pounds of meat per week, or about one and a half pounds per day. There was a very rapid decrease in the rate of consumption of food to a given weight of animal as it fattened. The nearer a fattening animal approached maturity, the greater was the proportion of fat in the gross increase obtained.

Indian corn and barley-meal contain less than two per cent. nitrogen, bran about two and three-quarters per cent., beans and lentils about four and a half per cent., and dried codfish about six and a half per cent. Dried codfish contains less than one per cent. of fatty matter, beans and lentils two and a quarter per cent., barley-meal about the same, and Indian corn and bran about five per cent.

It was found that "the larger the proportion of nitrogenous compounds in the food, the greater was the tendency to increase in frame and flesh, but that the maturing or ripening of the animal, in fact, its fattening, depended very much more on the amount of 'certain digestible non-nitrogenous constituents in the food.' It also appeared that some of the cheaper highly nitrogenous foods would produce a given amount of gross increase more economically than the expensive ones (peas, beans) which are usually preferred by pork-feeders.

"If the amount of gross produce in meat in return for a given amount of food, of a given money value—is alone to be taken into consideration, then, in addition to roots, wash, etc., it would be most advantageous to rely for fattening upon highly nitrogenous foods, such as dried fish, or animal refuse, or leguminous seeds, beans, lentils, and the like, because not only would the weight be obtained at less cost than by the use of cereal grains, but the manure—the value of which must never be lost sight of in calculating the economy of the feed process—would be much richer than if the latter were employed. But it is not a large amount of gross increase that makes the farmer's profit upon his sties. When pigs are fed freely upon highly succulent food, such as cooked roots, the refuse of starch, herbs, and the like, they are frequently found to give a very rapid increase. But pork so fed is found to sink rapidly in the salting process, and to waste considerably when boiled. And although the first batch of pigs so fed may fetch a good price, their character is at once detected, and the market closed against a second sale.

"On the other hand, when pigs are fattened upon the highly nitrogenized leguminous seeds—peas being, however, much less objectionable than some others—the lean is hard, and the fat wastes in cooking. Fish, flesh, and strong oily matters give the pork a rank flavor.

"Finally, it is the interest of the farmer to use highly nitrogenous leguminous seeds, and even refuse flesh, if at command, during the earlier and growing stages of his bacon hogs. But if a constant market is to be secured for pork, barley-meal or other cereal grain must supersede every thing else as fattening proceeds." Thus Mr. Lawes confirms Mr. Tyrrel, and gives us a golden maxim for making a pig pay —a little bran or bean meal, and plenty of Indian corn.

Diseases of Swine.—In order to prescribe with any reasonable hopes of success, for any animal, a knowledge of that animal's anatomy, physiology, and habits when in health, are indispensable, and an intimate acquaintance with the characters of the substances employed as remedies. we would not recommend you to place any confidence in books published by quacks, and purporting to contain infallible specifics for the several diseases to which live-stock are liable. Veterinary text-books, written by competent persons, are very different things. A host of honorable names stand upon record, on the face of their publications, in proof of the correctness of my assertion. By diligent study of these books, farmers might, I have little doubt, eventually arrive at a very respectable share of veterinary knowledge; acquire a tolerable idea of the internal structure of the several inhabitants of the farm-yard, and of their physiology; by practical observation they would become able to detect the presence of disease from the symptoms present, and be able to adopt such a course of treatment as might be suggested in the books they possessed. Under these circumstances, apply, if possible, to a regular veterinary surgeon.

Swine are by no means the most tractable of patients. It is any thing but an easy matter to compel them to swallow any thing to which their appetite does not incite them, and hence, "prevention" will be found "better than cure." Cleanliness is, in my opinion, the great point to be insisted upon in swine management; if this, and warmth, be duly attended to, the animal will not, save in one case perhaps in a hundred, become affected with any ailment.

As, however, even under the most careful system of management, an occasional disappointment may occur, the reader is furnished with the following brief view of the principal complaints by which some are, under the most unfavorable circumstances, liable to be attacked, and the plainest effectual mode of sanatory treatment, in such cases, to be adopted.

The principal diseases to which swine are liable are:—1. Fever; 2 Leprosy; 3. Murrain; 4. Measles; 5. Jaundice; 6. Foul skin; 7. Mange; 8. Staggers; 9. Cracklings; 10. "Ratille," or swelling of the spleen; 11. Indigestion, or surfeit; 12. Lethargy; 13. Heavings; 14. "Diarrhœa;" 15. Quinsy; 16. Tumors; 17. Catarrh.

All which dangerous and often fatal maladies may be PREVENTED from occurring by the simple attention to cleanliness already recommended, with judicious feeding. A hog can be relieved by bleeding, when such an operation will effect relief, whether he like to submit or not; but it is very questionable whether he can be compelled to swallow medicines without his perfect consent and concurrence; these, therefore, will best be administered by stratagem, and the hog's *appetite* is the only assailable point he has.

Fever.—The symptoms are, redness of the eyes, dryness and heat of the nostrils, the lips, and the skin generally; appetite gone, or very defective, and the presence, usually, of a very violent thirst. Of course, no symptom can be regarded as individually indicative of the presence of any particular disease; these, which I have named, might, individually, indicate the presence of many other disorders, nay, of no dis order at all, but collectively, they point to the presence of fever as their origin.

Let the animal, as soon as possible after the appearance of these symptoms, be bled, by cutting the veins at the back of his ears. The pressure of the finger raises the vein, and you can then puncture it with a lancet. If the bleeding from this channel be not sufficiently copious, you must cut off a portion of his tail; and after bleeding let him be warmly housed, but, at the same time, while protected from cold and draughts, let the sty be well and thoroughly ventilated, and its inmate supplied with a constant succession of fresh air. The bleeding will usually be followed, in an hour or two, by such a return of appetite as to induce the animal to eat a sufficient quantity of food to admit of your making it the vehicle for administering such internal remedies as may seem advisable. The best vehicle is bread steeped in broth. The hog, however, sinks so rapidly, when once he loses his appetite that no depletive medicines are in general necessary or suitable; the fever will usually be found to yield to the bleeding, and your only object need be the support of the animal's strength, by small portions of nourishing food, administered frequently.

Do not, however, at any time suffer your patient to eat as much as his inclination might prompt; the moment he appears to be no longer *ravenous*, remove the mess, and do not offer it again until after a lapse of three or four hours. It is a singular fact, that as the hog surpasses every other animal in the facility with which he acquires fat, he likewise surpasses all others in the rapidity with which his strength becomes prostrated when once his appetite deserts him. The French veterinarian practice recommends the addition of peppermint to the bread and broth. If the animal be not disgusted by the smell, it may be added; and if the bowels be confined, the addition of castor and linseed oil, in equa quantities, and in the proportion of two to six ounces, according to th size of the hog, should not be omitted.

If you find yourself unable to restore the animal's appetite, the case is nearly hopeless, and you may regard its return as one of the most infallible symptoms of returning convalescence. It is, however, *possible* to administer medicine to the pig by *force;* although, for my own part, I cannot say that I have ever found it practicable.

There is a description of fever that frequently occurs as an epizootic. It often attacks the male pigs, and generally the most vigorous and the best-looking, without any distinction of age, and with a force and promptitude absolutely astonishing; for in the space of twelve hours, I have sometimes seen a whole piggery succumb: at other times its progress is much slower; the symptoms are less intense and less alarming; and the veterinary surgeon, employed at the commencement of the attack, may promise himself some success.

The Causes of the Disease are, in the majority of cases, the bad sties in which the pigs are lodged, and the noisome food which they often contain. The food which the pigs meet with and devour, are the remains of mouldy bread and fruit, especially those of pease and lentils—the fermentation and decomposition of which farinaceous substances, and especially the bran which is too frequently given to them, and the prolonged action of which determine the most serious in the whole economy. In addition to this, is the constant lying on the dung-heap, whence is exhaled a vast quantity of deleterious gas; also, where they remain far too long, on the muddy or arid ground, or are too long exposed to the rigor of the season.

As soon as a pig is attacked with disease, he should be separated from the others, placed in a warm situation, some stimulating ointment to be applied to the chest, and a decoction of sorrel administered. Frictions of vinegar should be applied to the dorsal and lumbar region. The drinks should be emollient, slightly imbued with nitre and vinegar, and with aromatic fumigation about the belly. If the fever now appears to be losing ground, which may be ascertained by the regularity of the pulse, by the absence of the plaintive cries that were before heard, by a respiration less laborious, by the absence of convulsions, and by the non-appearance of blotches on the skin, there is a fair chance of recovery. We may then be content to administer, every second hour, the drinks and the lavements already prescribed, and to give the patient his proper allowance of white water, with ground barley and rye. When, however, instead of these fortunate results, the symptoms are redoubling in intensity, it will be best to destroy the animal; for it is rare, that, after a certain period, there is much or any chance of recovery. Bleeding, at the ear or tail, is seldom of much avail, but occasionally produces considerable loss of vital power, and augments the putrid diathesis.

Leprosy.—The symptoms of this complaint usually commence with the formation of a small tumor in the eye, followed by general prostration of spirits; the head is held down and the whole frame inclines toward the ground: universal languor succeeds; the animal refuses food, languishes, and rapidly falls away in flesh; blisters soon make their appearance beneath the tongue, then upon the throat, the jaws, the head and the entire body. The flesh of a leprous pig is said to possess most pernicious qualities, and to be wholly unfit for human food. If the animal be killed in the very first stage of the disease, however, the affection is only superficial, the flesh nothing the worse, but rather improved in tenderness, and indeed, not to be distinguished from that of a perfectly sound animal. The cause of this disease is want of cleanliness, absence of fresh air, want of due attention to ventilation, and foul feeding. The obvious cure therefore is—first, bleed; clean out the sty daily; wash the affected animal thoroughly with soap and water, to which soda or potash has been added; supply him with a clean bed; keep him dry and comfortable; let him have gentle exercise and plenty of fresh air; limit the quantity of his food, and diminish its rankness; give bran with wash, in which you may add, for an average-sized hog, say one of one hundred and sixty pounds' weight, a tablespoonful of the flour of sulphur, with as much nitre as will cover a sixpence, daily. A few grains of powdered antimony may also be given with effect.

Murrain.—Resembles leprosy in its symptoms, with the addition of staggering, shortness of breath, discharge of viscid matter from the eyes and the mouth. The treatment should consist of cleanliness, coolness, bleeding, purging, and limitation of food. Cloves of garlic have been recommended to be administered in cases of murrain. Garlic is an antiseptic, and as, in all these febrile diseases, there exists more or less a degree of disposition to putrefaction, it is not improbable that it may be found useful.

Measles.—This is one of the most common diseases to which hogs are liable. The symptoms are redness of the eyes, foulness of the skin, depression of spirits, decline, or total departure of the appetite, small pustules about the throat, and red and purple eruptions on the skin. These last are more plainly visible after death, when they impart a peculiar appearance to the grain of the meat, with fading of its color, and distension of the fiber so as to give an appearance similar to that which might be produced by puncturing the flesh.

Suffer the animal to fast, in the first instance, for twenty-four hours, and then administer a warm drink, containing a drachm of carbonate of soda and an ounce of bole Armenian; wash the animal, cleanse the sty, and change the bedding; give at every feeding, say thrice a day, thirty grains of flour of sulphur, and ten of nitre. It is to dirt, combined with a common fault too little thought of, viz., giving the steamed food or wash to the hogs at too high a temperature, that this disease is generally to be attributed. It is a troublesome malady to eradicate, but usually yields to treatment, and is rarely fatal.

Jaundice.—Symptoms—yellowness of the white of the eye, a similar hue extending to the lips, with sometimes, but not invariably, swelling of the under part of the jaw. Bleed behind the ear, diminish the quantity of food, and give a smart aperient every second day. Aloes are, perhaps, the best, combined with colocynth: the dose will vary with the size of the animal.

Foul Skin.—A simple irritability or foulness of the skin will usually yield to cleanliness and a washing with solution of chloride of lime, but if it has been neglected for any length of time, it assumes a malignant character, scabs and blotches, or red and fiery eruptions appear, and the disease rapidly passes into mange.

Mange.—If the foul hide already described had been properly attended to, and the remedies necessary for its removal applied in sufficient time this very troublesome disorder would not have supervened. Mange is supposed, by most medical men, to owe its existence to the presence of a minute insect, called "*acarus scabiei*," or "mange-fly," a minute creature, which burrows beneath the cuticle, and in its progress through the skin occasions much irritation and annoyance. Others, again, do not conceive the affection styled mange to be thus produced, but refer it to a diseased state of the blood, which, as is usually the case, eventually conveys its morbid influences to the superficial tissues. Much has been, and still more might be said on both sides of the question, but such a discussion is scarcely suitable to the pages of a popular work. The symptoms of the disease are sufficiently well known, consisting of scabs, blotches, and sometimes multitudes of minute pustules, on different parts of the body. If neglected, these symptoms will become aggravated; the disease will rapidly spread over the entire surface of the skin, and if suffered to proceed upon its course, unchecked, it will ere long produce deep-seated ulcers and malignant sores, until the whole carcass of the poor affected animal becomes one mass of corruption.

The Causes of Mange have been differently stated; some referring them to too high, and others to too low a diet. The cause is to be looked for in *dirt*, accompanied by *hot-feeding;* hot-feeding alone would, perhaps be more likely to produce *measles* than *mange*, but *dirt* would unquestionably produce the latter disease, even if unaided by the concomitant error of hot-feeding.

Hogs, however well and properly kept, will occasionally become affected with this, as well as with other disorders, from *contagion*. Few diseases are more easily propagated by *contact* than mange. The introduction of a single affected pig into your establishment may, in one night, cause the seizure of scores, and probably furnish you with a three months' hospital experience. Do not, therefore, introduce any foul-skinned pigs into your piggery; in fact, it would be a very safe proceeding to wash every new purchase with a strong solution of *chloride of lime*. This substance is very cheap, and a little trouble, when applied as a preventive, is surely preferable to a great deal of both trouble and *disappointment* when you are compelled to resort to it to cure.

If a hog be only afflicted with a mange of moderate virulence, and not of *very long standing*, the best mode of treatment to be adopted is:

1. Wash the animal from snout to tail, leaving no portion of the body uncleansed, with *soft soap* and water.

2. Put him into a dry and clean sty, which is so built and situated as to command a constant supply of fresh air, without, at the same time, being exposed to cold or draught; let him have a bed of clean, fresh straw.

3. Reduce his food, both in quality and in quantity; let boiled or steamed roots, with buttermilk or dairy wash, supply the place of half-fermented brewers' grains, house-wash, or any other description of feeding calculated to prove of a heating or inflammatory character. It is, of course, scarcely necessary to add, that those who have been feeding their swine on *horse-flesh*, or chandlers' greaves, cannot be surprised at

the occurrence of the disease; let them, at all events, desist from that [illegible] and nasty mode of feeding, and turn to such as has been indicated.

4. Let your patient fast for five or six hours, and then give, to a hog of average size—Epsom salts, two ounces, in a warm bran wash. This quantity is to be increased or diminished as the size may require. The above would suffice for a hog of 160 lbs. It should be previously mixed with a pint of warm water. This should be added to about half a gallon of warm bran wash. It will act as a gentle purgative.

5. Give in every meal afterward—of flour of sulphur, one table-spoonful; of nitre, as much as will cover a sixpence, for from three days to a week, according to the state of the disease. When you perceive the scabs begin to heal, the pustules to retreat, and the fiery sores to fade, you may pronounce your patient cured. But before that pleasing result will make its appearance, you will perceive an apparent increase of violence in all the symptoms—the last effort of the expiring malady, as it were, ere it finally yields to your care and skill.

6. There are, however, some very obstinate cases of mange occasionally to be met with, which will not so readily be subdued. When the above mode of treatment has been put in practice for fourteen days, without effecting a cure, prepare the following: train oil, one pint; oil of tar, two drachms; spirits of turpentine, two drachms; naphtha, one drachm; with flour of sulphur, as much as will form the above into the consistency of a thick paste. Rub the animal, previously washed, with this mixture—let no portion of the hide escape you. Keep the hog dry and warm after this application, and suffer it to remain on his skin three entire days. On the fourth day, wash him once more with soft soap, adding a small quantity of *soda* to the water. Dry the animal well afterward, and suffer him to remain as he is, having again changed his bedding, for a day or so: continue the sulphur and nitre as before. I have never known any case of mange, however obstinate, that would not, sooner or later, give way before this mode of treatment.

7. Your patient being convalescent, whitewash the sty; fumigate it, by placing a little chloride of lime in a cup, or other vessel, and pouring a little vitriol upon it. In the absence of vitriol, however, boiling water will answer nearly as well.

Finally, all mercurial applications are, as much as possible, to be avoided; but, above every thing, avoid the use of ointments composed of hellebore, corrosive sublimate, or tobacco-water, or, in short, any *poisonous* ingredient whatever; very few *cures* have ever been effected by the use of these so-called remedies, but very many *deaths* have resulted from their adoption.

Staggers, caused by excess of blood to the head; bleed freely from behind the ears, and purge.

Crackings will sometimes appear on the skin of a hog, especially about the root of the ears and tail, and at the flanks. These are not at all to be confounded with mange, never resulting from any thing but exposure to extremes of temperature, without the suffering animal being able to avail himself of such protections as, in a state of nature, instinct would have induced him to adopt. They are peculiarly troublesome in the heats of summer, if the hog be exposed to a hot sun for any length of time, without the advantage of a marsh or pool in which to lave his parched limbs and half-scorched carcass. Anoint the cracked parts twice or thrice a day with tar and lard melted up together.

Ratille, or Swelling of the Spleen.—The symptom most positively indicative of this disease, is the circumstance of the affected animal leaning toward one side, cringing as it were, from internal pain, and bending toward the ground. The cause of the obstruction on which the disease depends is over-feeding, permitting the hog's indulging its appetite to the utmost extent that gluttony may prompt and the capacity of its stomach admit of; a very short perseverance in this mode of management will produce this, as well as other maladies deriving their origin from a depraved condition of the secretions and obstruction of the excretory ducts.

On first perceiving the complaint, clear out the alimentary canal by means of a strong aperient. If you think you can manage it, you may administer this forcibly, by having the mouth kept open by two cords, that attached to the upper jaw being thrown across a joist, and drawn just so tight as to compel the patient to support himself on the extremities of his fore-toes; or allow the animal to fast for from four to five hours, he will then take a little sweet wash or broth, and in it you may mingle a dose of Epsom salts, proportioned to his bulk. This will generally effect the desired end of a copious evacuation, and the action of this medicine on the watery secretions will further relieve the existing diseased state of the spleen. Many recommend *bleeding;* and if the affection have continued for any length of time, it should be resorted to at once; when the disease is, however, discovered ere it has attained any considerable head, the aperient will suffice. The French veterinarians recommend the expressed juice of the leaves and tops of wormwood and liverwort to be given, half a pint for a dose. The decoction of these plants produced by boiling them in soft water for six hours, may be given in doses of from half a pint to a pint and a half, according to the size, age, etc., of the patient.

Scammony and rhubarb, mixed up in a bran mash, or with Indian meal, may be given with advantage the following day, or equal portions of blue-pill mass and compound colocynth pill, formed into a bolus with butter, and the animal, having been kept fasting the previous night, will probably swallow it; if he will not do so, let his fast continue for a couple of hours longer. Lower the animal's diet, and keep him on reduced fare, with exercise, and if you can manage it, *grazing*, until the malady has quite passed away; if you then wish to fatten, remember to do so gradually; be cautious of at once restoring the patient to full diet.

Surfeit.—Another name for indigestion; the symptoms are such as might be expected—panting, loss of appetite, swelling of the region about the stomach, etc., and frequently throwing up the contents of the stomach. In general, this affection will pass away, provided it is only permitted to cure itself, and all food carefully kept from the patient for a few hours; a small quantity of sweet grains, with a little bran-wash, may then be given, but not nearly as much as the animal would wish to take. For a few days the food had better be limited in quantity, and of a washy, liquid nature. You may then resume the ordinary food, only observing to feed regularly, and remove the fragments remaining after each meal.

Lethargy.—Symptoms, torpor, and desire to sleep, hanging of the head, and frequently redness of the eyes. The apparent origin of this disease is the same as the last, only in this instance acting upon a hog having a natural tendency to a redundancy of blood. Bleed at the back of both the ears as copiously as you can, and if you cannot obtain a sufficient quantity of blood from these sources, have recourse to the tail. Administer an emetic, of which a decoction of chamomile flowers will be found the safest; or a sufficient dose of tartar emetic, which will be far more certain. After this, reduce for a few days the amount of the animal's food, and administer a small portion of sulphur and nitre in each morning's meal.

Heavings, or Inflammation of the Lungs.—This disease, which has acquired its name from the principal symptom by which it is characterized, is scarcely to be regarded as curable. If indeed, it were observed in its first stage, when indicated by loss of appetite, and a short, hard cough, it might run some chance of being got under by copious bleeding, and friction with stimulating ointment on the region of the lungs, minute and frequent doses of tartar emetic should also be given in butter, all food of a stimulating nature carefully avoided, and the animal kept dry and warm. Under these circumstances, there would be no reason absolutely to despair of a cure, but it would be advisable at the same time, if the hog, when this primary stage of the malady was discovered, were not in very poor condition, to put him to death. If once the heavings set in, it may be calculated with confidence that the formation of tubercles in the substance of the lungs has begun, and when these are once formed, they are very rarely absorbed. The cause of this disease is damp lodging, foul air, want of ventilation, and unwholesome food. It is difficult to suggest what should be done when matters have reached this pass, or what remedies would prove of any service. It is now too late in most cases to resort to blood-letting, and the hide of the hog is so tough that it is not easy to blister it, for the purpose of counter-irritation; you may, however, try the following, though perhaps the knife might be best, if only to relieve the poor sufferer, and provide against the danger of infection; for it may be as well to state that, once tubercular formation becomes established, the disease may be communicated through the medium of the atmosphere, the infectious influence depending upon the noxious particles respired from the lungs of the diseased animal. Shave the hair away from the chest, and beneath each fore-leg; wet the part with spirits of turpentine, and set fire to it; you will, of course, have had the patient well secured, and his head well raised, and have at hand a flannel cloth, with which to extinguish the flame, when you conceive it has burned a sufficient time to produce slight blisters; if carried too far, a sore would be formed, which would be productive of no good effects, and cause the poor animal unnecessary suffering. Calomel may also be used, with a view to promote the absorption of the tubercles, but the success is questionable.

Diarrhœa, or Looseness.—The symptoms, of course, require no comment, as they constitute the disease. Before attempting to stop the discharge—which, if permitted to continue unchecked, would rapidly prostrate the animal's strength, and probably terminate fatally—ascertain the quality of food the animal has recently had. In a majority of instances, you will find this to be the origin of the disease; and if it has been perceived in its incipient stage, a mere change to a more binding diet, as corn, flour, etc., will suffice for a cure; if you have reason to apprehend that acidity is present, produced in all probability by the hog having fed upon coarse, rank grasses in swampy places, give some chalk in the food, or powdered egg-shells, with about half a drachm of powdered rhubarb; the dose of course varying with the size of the hog. In the acorn season, and where facilities for obtaining them exist, they alone will be found quite sufficient to effect a cure. When laboring under this complaint, dry lodging is indispensable; and diligence will be necessary to maintain it and cleanliness.

Quinsy, or Inflammatory Affection of the Glands of the Throat.—Shave away the hair, and rub with tartar emetic ointment. Stuping with very warm water is also useful. When external suppuration takes place, you may regard it as rather a favorable symptom than otherwise. In this case, wait until the swellings are thoroughly ripe; then, with a sharp knife, make an incision through the entire length, press out the matter, wash with warm water, and afterward dress the wound with any resinous ointment, or yellow soap with coarse brown sugar.

Tumors, or Hard Swellings, which make their appearance on several different parts of the animal's body. It would not be easy to state the causes which give rise to these tumors, for they vary with circumstances. They are not formidable, and require only to be suffered to progress until they soften; then make a free incision, and press out the matter. Sulphur and nitre should be given in the food, as the appearance of these swellings, whatever be their cause, indicates the necessity of alterative medicines.

Catarrh, an inflammation of the mucous membranes of the nose, etc., if taken in time, is easily cured by opening medicine, followed up by warm bran-mash, a warm, dry sty, and abstinence from rich grains or stimulating farinaceous diet. The cause has probably been exposure to drafts of air—see to it.

The instructions given comprise all that the amateur will ever find necessary for domestic practice, and far more than he will ever find occasion to follow, if he have attended to cleanliness, dry lodging, regularity of feeding, the use of salt in the food, and the addition of occasionally a small quantity of sulphur and nitre to the morning's meal.

Medicines Employed in the Treatment of Swine.—Few medicines are requisite in the treatment of swine. Of these the chief are common salt, Epsom salts (dose, from one-half to two ounces); sulphur (dose, one-half to one and a half ounces); useful as the basis of ointments for cutaneous diseases; nitrate of potass (dose, one scruple to one drachm); ginger (dose, one scruple to one drachm); croton-oil (dose, one to three drops); castor-oil (dose, one-half to two ounces); jalap (dose, one scruple to one half-drachm). Besides these, we may mention oil, mercurial ointment, and turpentine, as ingredients in ointments, mixed with sulphur, for cutaneous affections. Turpentine, it may be observed, is useful in cases of worms; it may be given in doses of about half an ounce or more, in gruel.

SLAUGHTERING AND CURING.—The Almighty Creator, when he had formed man, and placed him upon the earth, gave him power of life and death over all the inferior animals. This power was, however, given to him to be used, not to be abused; while permitted to slay for food, clothing, or other necessaries—nay, luxuries of life—it was never designed by our all-benevolent as well as omnipotent Lord that this power should be converted into a medium of cruelty, or that life should be taken away from any of his creatures in any other than the most humane manner possible. The necessity of humanity toward animals thus stands as not only a high moral duty, but one absolutely enjoined as a divine ordinance; it is also a part and parcel of all that is noble or excellent in human nature.

It is a mistake to suppose that this poor animal is insensible to pain. The poor hog does indeed feel, and that most acutely; well would it be for him that he did not, for then what miseries would he not be spared!—he would not then care whether he was put out of pain at once, or suffered to hang up by the hind-legs, the limbs previously dislocated at the hocks, between the tendons and the bone of which has been passed the hook by which he is suspended. Were he indeed insensible to pain, it would of course be a matter of indifference whether or not he were suffered to die first, or—as soon as he had bled a sufficient quantity—was, still living and breathing, plunged into boiling water, in order to remove his hair; or then, with a refinement of cruelty that would not even permit of his being put out of his misery so soon, removed from the cauldron, ere life or feeling had yet departed, opened, and disemboweled alive.

We should be sorry to give pain to the feelings of any of our readers, but we had rather hurt their feelings than leave a suffering, a tortured quadruped, and that, too, one so useful to us, to experience such an ungrateful return, in the shape of such terribly revolting miseries. We have described only what we have personally witnessed, and we trust that what we have said may lead master-butchers and others to ascertain the conduct of their slaughterers, and the manner in which they perform their necessary but painful duty.

The usual mode of killing a hog in the country parts of England is, or used lately to be, by fastening a rope around the upper jaw, and throwing it across a joist or beam; this is hauled by an assistant just sufficiently tight to compel the animal to support himself upon the extremities of his toes, with his snout elevated in the air. The butcher then kneels in front of him, and taking a sharp and pointed knife, first shaves away the hair from a small portion of the front of the throat, then gently passing the sharp-pointed steel through the superficial fat, gives it a plunge forward, a turn, and withdraws his weapon. A gush of blood follows, which is usually caught in proper vessels, for the purpose of forming black puddings. The rope is somewhat slackened—the victim totters, reels, the eye glazes—his screams cease—he falls, and life would speedily become extinct; but, alas! the butcher is paid by the job, he is in a hurry, and ere the breath is out of the poor brute's carcass—nay, ere he ceases to struggle or moan—he is tumbled into the scalding tub; he is then withdrawn in a second, placed upon a table, the hair and bristles carefully removed by scraping with a knife; disemboweling follows—and it is well if the poor wretch has perished before that process commenced.

In olden times it would appear that our butchers were less hasty, or more merciful. All the skulls of hogs were broken in upon the frontal bones, precisely in the same manner as are now the skulls of oxen and other animals. Were the hog first deprived of sensibility by compression of the brain, as produced by a violent blow upon the forehead, he would be a passive victim in the butcher's hands, who could not only perform all the remainder of the process with more humanity, but—and think well of it, such of you as might probably be swayed by no other consideration—with more dispatch and less trouble.

We are happy in being able to add, that a humane custom of knocking the hog on the head before cutting his throat is rapidly gaining ground, and that no respectable butcher will allow it to be dispensed with. In the country parts of both England and Ireland, however, the old abuses are still permitted to exist; and we are grieved to say that everywhere, with a very few honorable exceptions, the barbarous practice of plunging the hog into the scald while yet living, is still systematically and designedly adopted. A very respectable man surprised us the other day by deliberately telling us that "a hog will no way scald so well as when the life is in him." This is, however, a mistake. It is only necessary not to suffer the animal to become cold and stiff. Readers—we raise our voice in behalf of a very useful and most cruelly-treated animal—may we beg of all to unite with us in the cause of humanity, and then we shall not have raised our voice in vain.

And now, having supposed the animal killed and dressed, let us proceed to inquire into the most approved modes by which its flesh may be converted into bacon and ham. The hog should be left fasting for full twenty-four hours before killed; and after the carcass has hung all night, it should be laid on its back upon a strong table. The head should then be cut off close by the ears, and the hinder feet so far below the houghs as not to disfigure the hams, and leave room sufficient to hang them up by; after which the carcass is divided into equal halves, up the middle of the back-bone, with a cleaving-knife, and, if necessary, a hand-mallet. Then cut the ham from the side by the second joint of the back-bone, which will appear on dividing the carcass, and dress the ham by paring a little off the flank, or skinny part, so as to shape it with a half-round point, clearing off any top fat that may appear. The curer will next cut off the sharp edge along the back-bone with a knife and mallet, and slice off the first rib next the shoulder, where he will find a bloody vein, which must be taken out, for, if left in, that part is apt to spoil. The corners should be squared off when the ham is cut out.

This passage is quoted because it describes a novel mode of cutting bacon, and which we have not as yet seen practiced. The ordinary practice is to cut out the spine or back-bone, and, in some English counties, to take out the ribs also. It is only in porkers that the backbone is thus divided.

The most approved mode of saving bacon, as practiced by a majority of those extensive curers who have kindly favored us with the necessary details of this portion of our subject, is as follows: if the swine you design killing have been a recent purchase, and have been driven from a distance, so as to have become winded or jaded, it is right that they should be kept up for a week, or perhaps more, until the effects of the journey have been entirely removed, and the animals restored to their original tranquillity and primeness of condition; during this interval they should be fed upon meal and water. A difference of opinion exists, as to whether this food should be given in a raw state or boiled. We have taken some pains to ascertain the truth, and have no hesitation in pronouncing in favor of the latter; at the same time, however, the mess should be given in a perfectly cold state, and not of too thick consistence. Some recommend that a small dose of nitre should be given daily in the food for a fortnight previous to killing; others pronounce this to be unnecessary; but all unite in recommending a very considerable reduction in the animal's food for two or even three days before killing, and a total deprivation of food for at least the last twelve hours of life.

In the country districts of Ireland, the hog is usually secured by the hind-leg to a post or ring, the head is fastened to another; the animal is thus secnrely strapped down upon a sloping slab or table, and the head is severed from the body by means of a sharp knife. I am informed that the bacon of a hog thus killed is more easily saved, and is superior in flavor and color.

The ordinary mode of killing a hog is, we are most happy to say, gradually approximating to such as humanity would dictate. It is thus: a flat stage or table, inclining downward in one direction, is prepared; the pig receives a powerful blow with a mallet upon the forehead, which effectually deprives him of sensation; he is then thrown upon the stage, and a knife plunged into the chest, or rather into that spot where the chest meets the neck. The blood flows freely, and is received into vessels placed for the purpose. A large tub or other vessel has been previously got ready, which is now filled with boiling water. The car cass of the hog is plunged into this, and the hair is then removed with the edge of a knife. The hair is more easily removed if the hog be scalded ere he stiffens or becomes quite cold, and hence some butchers cruelly conceive it advisable to scald him while yet there is some life in him. The animal is now hung up, opened, and the entrails removed; the head, feet, etc., are cut off, and the carcass divided, cutting up at each side of the spine. A strong knife and mallet are necessary for this purpose, and will be found to answer better than a saw.

HOW TO CURE BACON AND HAMS.—One and a half pounds of salt and one ounce of saltpetre are enough to salt fourteen pounds of meat, or two hundred weight of meat will require twenty-four pounds of salt.

The following is Mr. Rowlandson's plan:—"Having cut up a well-fed hog, which absorbs much less salt than an ill-fed animal, and runs very little risk of being over-fed, salt, and saltpetre, in the proportions described, must be sprinkled over the flitches, etc., and then they must be laid one over the other in a slate trough, or a wooden trough lined with lead, to the number of half a dozen; in the course of twenty-four hours, or forty-eight hours, according as the salt is converted into brine (and this will depend on the weather—in frosty weather the meat will not take the salt, and in moist weather it is apt to spoil), the sides are removed, rubbed, replaced in inverse order, the top at the bottom, with a little fresh salt sprinkled between each course, and the brine thrown over the whole. In favorable weather for curing, once turning and replacing will be found enough, and will not occupy more than a week.

Bacon is cured in very different ways. For domestic use, it is usually laid upon a table, and salt, with a little nitre added, well rubbed in, first on one side and then on the other, either with the bare hand or the salting-glove. Some straw is then placed upon the floor of an out-house, a flitch laid thereon, with the rind downward—straw laid above this, then another flitch, and so on; above the whole is placed a board, and, heavy stones or weights above all. In three weeks or a month the meat is sufficiently salted, and is hung up on hooks in the kitchen rafters. The general practice of burning wood and turf in Irish kitchens, imparts a sweetness to the bacon thus saved that is not to be met with in any which you can purchase.

Another method is as follows:—prepare a pickle, by boiling common salt and nitre in water; mix, for a single hog, of tolerable size, one pound of coarse brown sugar, with half a pound of nitre; rub this well in with the salting-glove, then put the meat into the pickle, and let it lie in this for two days; afterward take it out of the pickle, and rub it with salt alone, then put it back into the pickle.

For a *mild cure*—form *sweet pickle*, by boiling molasses with salt and water; rub the meat with sugar and nitre—add a small portion of strong pickle to the meat—put the meat into this, and let it lie in it for about three weeks. If there be any spare room in the cask, fill up with molasses—eight pounds of salt; one pound of nitre, and six pints of molasses will about suffice for each hundred weight of meat; and will take about five gallons of water.

In about three weeks—less or more time being required according to size—take the meat out of pickle, and hang it in the drying-house. While in the drying-house, the flitches should be hung, neck downward. You may cut out the ham, and trim the flitch according to fancy—nearly every county in England has in this respect a fashion of its own.

You then remove your hams and bacon to the smoking-house; they should not be suffered to *touch each other;* with this precaution you may hang them as close as you please. Smoke-houses are of every dimension, but the smallest answer as well as the most extensive. Before suspending the meat in the smoke-house, it should be previously well rubbed over with bran. The fire is made of saw-dust, which burns with a low smouldering glow, giving out far more smoke than if actually flaming.

In the process of smoking, your meat will lose from about fifteen to twenty pounds per hundred weight—a fact necessary to be borne in mind.

Sometimes the hogs are killed before they arrive at full size, and their hair removed by singeing; the bacon and hams of these are said to possess peculiar delicacy of flavor.

The best saw-dust for smoking hams or bacon is that made from oak, and it should be thoroughly dry. The saw-dust of common deal imparts a flavor of a disagreeable character, not unlike that of red herrings.

Westphalian Hams.—The *genuine* Westphalian bacon is particularly good, but all sold under that name is not genuine; spurious Westphalian hams are manufactured to a considerable extent. The process of imitation is not difficult, and none but one of the trade can detect the imposture. The fine quality of Westphalian bacon depends on several causes: the healthy and semi-wild life the swine are permitted to enjoy—their relationship to the wild boar—they are not fattened to the fullest extent previous to killing. A large proportion of *sugar* and *juniper-berries* are used in curing—the proportion being usually one and a half pounds of sugar to three of salt, and two ounces of nitre. The *smoke* is also applied in a *cold state.* This is, perhaps, the principal secret. The hams are all hung at the top of a very lofty building, and by the time the smoke reaches them it is perfectly cold.

The ham of the Westphalian hog closely resembles that of the common old Irish breed; and the hams of that animal, when cured as has been described, could not be distinguished from those of Westphalia by the nicest judge.

Limerick.—The hams cured in Limerick have long enjoyed considerable celebrity, and are supposed to be superior to any others—those of Westphalia and Hampshire alone excepted. Their excellence appears chiefly to depend upon the sparing use of salt, and the substitution for it, to a great extent, of coarse sugar, with judicious smoking. Some of the Limerick smoking-rooms are upwards of thirty feet in height.

Hampshire.—The Hampshire bacon is in greater esteem than even the Westphalian—a circumstance attributable to the superior excellence of the New-Forest swine to those of that country, while they share equally with them the privilege of a forest life and acorns. The Hampshire curers smoke with saw-dust. In both this county and in Berkshire, *singeing* is adopted more generally than scalding, and this process is considered superior to scalding, the latter being supposed to soften the rind and render the fat less firm.

The Wiltshire bacon is of peculiarly delicious quality, but the cause is obvious, and is not to be referred to any of the details of the curing process. This bacon is prepared from *dairy-fed* pork—this is the true secret.

In some counties the pig is *skinned* prior to curing. Some amount of additional profit is of course derivable from this practice, but the bacon is inferior, being liable to become rusty, as well as to waste in the boiling.

Hams and flitches should always be hung up in a *dry* place, indeed it will be found useful to sew up the former in pieces of canvas or sacking, as is practiced with the Westphalian.

It is difficult to save bacon in summer time, or in warm climates, but a machine has recently been invented, for which a patent has been obtained, which renders the saving of meat under the most adverse circumstances perfectly easy. The machine acts as a force-pump or syringe. Its extremity is inserted into the meat, and the handle worked; the brine, which must be very strong, is thus *forced through* the grain of the meat, and it is effectually impregnated with it, and well cured long ere it could turn: there can be no doubt but that this instrument is, under the circumstances described, eminently useful—but it is no less certain that meat so cured is not equal to that saved under ordinary circumstances and in the ordinary manner; the *grain of the meat* is too much loosened by the use of the machine, and the texture is thus deteriorated; it should therefore only be used when *necessity* requires, and never by *preference*, where the ordinary process can be adopted.

To extract the superabundant salt from your meat, prior to use, has long been a desideratum. The steeping it in water to which carbonate of soda has been added, is found useful; so is the addition of the same substance, or of lime, to the water in which it is boiled; so is changing the water, after the meat has been about half-boiled. Sailors find washing the meat in sea-water very efficacious, but I have made the discovery that this object can be attained to a far fuller extent by a very simple chemical process.

Put your meat to steep in tepid water, and after it has lain in it for some hours, add a small quantity of sulphuric acid. In three or four hours take it out, and wash it two or three times in water; to the third water add a small portion of carbonate of soda. Take your meat out, wash it again, and boil it for dinner. You will find the salt nearly, if not wholly discharged; but you need not be surprised should the *color* of the meat be somewhat darkened—the deterioration does not extend farther; the flavor remains the same as when first corned, and the article becomes as wholesome as fresh meat. It is possible that this simple process may be found useful in long voyages, for a long-continued use of salted animal food, without a free use of vegetables, is found to contribute to the production of many diseases.

The following communication, coming from a curer by profession, will be found at once interesting and useful:

"The hog is usually kept fasting for twenty-four hours previous to being killed. He is then brought to the slaughter-house, and dispatched in the following manner: the butcher takes a mall (a hammer with a long handle, like those used for breaking stones on a road), and with it strikes the hog on the forehead; if he be an expert hand, a single blow will suffice to knock the hog down and render him quite senseless. A knife is then taken, and the butcher sticks the animal in the lower part of the throat, just between the fore-legs. A boiler or tub, full of very hot or boiling water, is then prepared, in which the hog is immersed until the hair becomes so loose that it can be scraped off with a knife quite clean; where there is no convenience of this kind, the same effect may be produced by pouring boiling water over the hog. The hog is then hung up by the hind-legs, cut up the middle, and the entrails taken out; after this, the carcass is left there for about twelve hours, to cool and become firm, when it is fit for boning or cutting up. Sometimes, instead of scalding, the hog is singed by fire—burned straw is generally used for this purpose; and this is called 'singed pork.'

"The following is the mode of boning or cutting: the pig is placed on a strong table or bench; the head is then cut off close to the ears; the hog is then opened down the back, a cleaver or saw is used for the purpose, and both back-bone and hip-bones are taken out, except in one or two places yet to be spoken of, where a different system is pursued. The hind-feet are then cut off, so as to leave a shank to the ham. The fore-legs are then cut round at the hough, the flesh scraped upward off the bone, and off the shoulder-blade, which is taken out quite bare, under the side. The saw is then run along the ribs, so as to crack them; they then lie quite flat. The hog is then divided straight up the back, and the sides are ready for salting, the ham still remaining in.

"When the sides are ready for salting, they are well rubbed on the rind side, and the space from which the shoulder-blade was taken out is filled with salt. The sides are then laid singly upon a flagged floor, and salt is shaken over them. In a day, or two days if the weather be cold, they must again be salted in the same manner; but now two sides may be put together, and powdered saltpetre shaken over each side, in the proportion of about two ounces to each side, if of average bacon size. After three or four days, the sides are to be again changed, the shanks of the hams rubbed, the salt stirred on, a little fresh salt shaken over them, and five or six sides may now be placed over each other. The sides may then be left thus for a week, when they may be piled one over the other to the number of ten or twenty sides, if you have killed so many hogs. Leave them so for above three weeks, until they get firm; they may then be considered saved, and will keep so for six or eight months, or according to pleasure.

"When required for use or for market, the sides are taken out of the salt, well swept and cleaned—the ham taken out, hung up, and dried with turf smoke; if a brown color be desired, a little saw-dust of hard wood may be thrown over the turf. If hung up in a kitchen where turf is burned, and suffered to remain, not too near the fire, the same effect will be produced; and if the bacon have been well saved in salt, it will be excellent.

"The Belfast and Limerick methods of cutting differ from what I have described, inasmuch as the hip-bones are left in, and the hams are cut out, while the hog is fresh, and saved separately. In some cases, also, the ribs are taken out of the sides, and, in Belfast, the shoulder-blade is taken out over the side.

"Both the Belfast and Limerick hams are cured in the same mild manner; they are, as I have stated, cut out of the hog when fresh, cured separately, and only left a sufficient time to be saved, and no more. They are not suffered to become too salty, a fault sometimes perceptible in the Wicklow hams. The Limerick and Belfast curers also make up different other portions of the hog separately, as long sides, middles, and rolls, for the English market.

"Sometimes the ribs are taken out, and sometimes not, according to the market for which they are intended.

"Limerick and Belfast hams are cured in the following manner:—They are cut fresh from the pig, with the hip-bones left in them, and are placed on a flagged floor, the front of the second ham resting upon the shank of the first, and so until all are placed; they are then sprinkled with strong pickle from a watering pot, and a small quantity of salt is shaken over them. Next day, the hams are taken up, well rubbed with salt, and laid down as before, when saltpetre is shaken over them in quantities proportionate to their size; they are left so for two days, and then taken up and rubbed as before, when they are laid down again, according to the space they have to fill—from three to six hams in height, with layers of salt between. After six days, the hams are reversed in the piles, that is, those that were packed on the top are put at the bottom. They then remain for six days longer in the pile, when they are considered cured. They are then taken up, and washed, and hung up to dry in the air. When they are to be smoked, they should be placed in a house made for that purpose, and smoked—in Belfast, with wheaten straw and saw-dust, in Limerick with peat or turf.

"The English method of cutting up and curing is similar to that practiced in Belfast and Limerick, with the difference that, with the exception of Hampshire and I believe one other county, they never smoke their bacon.

"We have, this season, had imported a great quantity of hams and other bacon from Cincinnati and Baltimore, in America. They are cut in the same manner as the Limerick, and are in much esteem. The cured shoulders of the hog have also been imported—cut straight across, with the blade in, and the shank left attached. We have also received middles, and quantities of pork, in barrels, which is merely the hog cut up in pieces, and pickled.

"I have reason to know that there are at the present time numbers of curers emigrating from our best curing districts to America, and we may accordingly expect, ere long, to find our American hams surpassing, owing to the quality of the hogs they will have to operate upon, even our long-famed Limerick hams."

LIVE-STOCK—NUMBER TO BE KEPT, ETC.

The animals necessary for the stocking and cultivation of a farm, and those which are kept on it for profit, or for the sake of their dung, are called the live-stock of the farm, in contra-distinction to the dead-stock, which consists of the implements of husbandry and the produce stored up for use.

The live-stock on a farm must vary according to circumstances. The number of horses or oxen kept for the cultivation of the land and other farming operations should be exactly proportioned to the work to be done. If they are too few, none of the operations will be performed in their proper time, and the crops will suffer in consequence. If there are too many, the surplus beyond what is strictly required is maintained out of the profits of the farm. To have the exact number of animals which will give the greatest profit is one of the most important problems which a farmer has to solve: what may be very profitable in one case may be the reverse in another; and, as a general maxim, it may be laid down, that the fewer mouths he has to feed, unless they produce an evident profit, the less loss he is likely to incur. But this rule admits of many exceptions. It is of great importance, in taking a farm, to calculate the extent of the arable land, so that it can be properly cultivated by a certain number of pairs of horses or oxen. It is an old measure of land to divide it into so many plows, that is, so many portions which can be tilled with one plow each. When there are several of these, it is useful to have an odd horse over the usual number required for two or three plows, to relieve the others occasionally. The work is thus done more regularly and with greater ease. Where there are two plows with two horses each, a fifth horse should be kept, and so in proportion for a greater number. The odd horse will always be found extremely useful, if not indispensable, and the expense of his keep will be amply repaid by the regularity and ease with which the whole work of the farm will be done, and the relief which occasional rest will give to the other horses.

The other part of the live-stock kept on a farm must depend on various circumstances. Where there is good grazing land, the profit on the improvement of the live-stock, or their produce, is evident and easily ascertained. But where animals are kept upon artificial food or fatted in stalls, it is often a difficult question to answer, whether there is a profit on their keep or not. In most cases the manure which their dung and litter afford is the chief object for which they are kept. If manure could be obtained in sufficient quantities to recruit the land, at a reasonable price, it might often be more advantageous to sell off all the hay and straw of a farm, and to keep only the cattle necessary to till the ground or supply the farmer's family. But this can only be the case in the immediate neighborhood of large towns. In the country at a greater distance no manure can be purchased; it must consequently be produced on the farm; and for this purpose live-stock must be kept, even at a loss. The management and feeding of live-stock is therefore an important part of husbandry. The object of the farmer is principally to obtain manure for his land, and if he can do this, and at the same time gain something on the stock by which it is obtained, he greatly increases his profits. Hence much more skill has been displayed in the selection of profitable stock than in the improvement of tillage. Some men have made great profits by improving the breed of cattle and sheep, by selecting the animals which will fatten most readily, and by feeding them economically. It requires much experience and nice calculations to ascertain what stock is most profitable on different kinds of land and in various situations. Unless very minute accounts be kept, the result can never be exactly known. It is not always the beast which brings most money in the market that has been most profitable; and many an animal which has been praised and admired has caused a heavy loss to the feeder. Unless a man breeds the animals which are to be fatted, he must frequently buy and sell; and an accurate knowledge of the qualities of live-stock and their value, both lean and fat, is indispensable. However honest may be the salesman he may employ, he cannot expect him to feel the same interest in a purchase or sale, for which he is paid his commission, as the person whose profit or loss depends on a judicious selection and a good bargain. Every farmer therefore should endeavor to acquire a thorough knowledge of stock, and carefully attend all markets within his reach to watch the fluctuation in the prices. It will generally be found that the principal profit in feeding stock is the manure, and to this the greatest attention should be directed. A little management will often greatly increase both the quantity and quality of this indispensable substance, and make all the difference between a loss and a profit in the keeping of stock.

THE "CREAM-POT" BREED OF CATTLE.—This is a valuable dairy-breed and promises to exceed all other breeds in this country, in the quantity and richness of the milk it furnishes, and the extraordinary amount of butter which it yields. This breed originated in New England, and was produced by Col. Jaques, of Ten Hills Farm, Somerville, Mass., by crossing the improved short-horns with the most valuable native breed. Col. Jaques thus speaks of the origin of this breed :—"Hearing of cows that produce seventeen pounds of butter each per week, the inquiry arose, why not produce a breed of such cows that may be depended on? This I attempted, and have accomplished. I have made from one of my Cream-Pot cows nine pounds of butter in three days on grass feed only.

"The bull Cœlebs, an imported thorough-bred Durham, and Flora, a heifer of the same breed, and imported, and a native cow, whose pedigree is entirely unknown, comprise the elements of the Cream-Pot breed of cattle. The native cow was bought in consequence of her superior quality as a milker, giving eighteen quarts a day, and averaging about fifteen. In the month of April, the cream of two days' milk produced two and three-fourths pounds of butter, made of two and one-sixteenth quarts of cream, and required but two minutes' churning. Thus much for the mother of the Cream-Pots.

"I have bred my Cream-Pots with red or mahogany-colored hair and teats, and gold-dust in the ears, yellow noses and skin, the latter silky and elastic to the touch, being like a fourteen-dollar cloth. My Cream-Pots are full in the body, chops deep in the flank, not quite as straight in the belly, nor as full in the twist, nor quite as thick in the thigh as the Durhams; but in other respects like them. They excel in affording a great quantity of rich cream, capable of being converted into butter in a short time, with little labor, and with a very small proportion of buttermilk, the cream producing more than eighty per cent. of butter. I have changed the cream to butter not unfrequently in one minute, and it has been done in forty seconds."

Henry Colman thus refers to Col. Jaques's stock :—"Mr. Jaques is entitled to great credit for his care and judicious selection in continuing and improving his stock. I have repeatedly seen the cream from his cows, and its yellowness and consistency are remarkable, and in company with several gentlemen of the Legislature, I saw a portion of it converted to butter with a spoon in one minute. The color of Mr. Jaques's stock is a deep red, a favorite color in New England; they are well formed and thrifty on common feed; and if they continue to display the extraordinary properties by which they are now so distinguished, they promise to prove the most valuable race of animals ever known among us for dairy purposes, and equal to any of which we have any information."

TO ESTIMATE THE LIVE WEIGHT OF CATTLE, etc.—Drovers and butchers by long experience become very expert in estimating, by simple inspection, the weight of live cattle; and in making purchases, they thus have a decided advantage over the less experienced seller. Hence, the importance to the latter of some means by which he can *know*, and not guess at the weight of his live animals.

The following rules, the result of careful experiments, and which we take from *The Valley Farmer*, will enable any one to ascertain the weight of live animals with a close approach to accuracy:—take a string, put it around the breast, stand square just behind the shoulder-blade, measure on a rule the feet and inches the animal is in circumference; this is called the girth; then, with the string, measure from the bone of the tail which plumbs the line with the hinder part of the buttock; direct the line along the back to the fore part of the shoulder-blade; take the dimensions on the foot-rule as before, which is the length; and work the figures in the following manner:—girth of the animal, say six feet four inches, length five feet three inches, which multiplied together, makes thirty-one square superficial feet, and that multiplied by twenty-three, the number of pounds allowed to each superficial foot of cattle measuring less than seven and more than five feet in girth, makes seven hundred and thirteen pounds. When the animal measures less then nine and more than seven feet in girth, thirty-one is the number of pounds to each superficial foot. Again, suppose a pig or any small beast should measure two feet in girth and two along the back, which multiplied together makes four square feet, that multiplied by eleven, the number of pounds allowed to each square foot of cattle measuring less than three feet in girth, makes forty-four pounds. Again, suppose a calf, a sheep, etc, should measure four feet six inches in girth, and three feet nine inches in length, which multiplied together make fifteen and a quarter square feet; that multiplied by sixteen, the number of pounds allowed to cattle measuring less than five feet and more than three in girth, makes two hundred and sixty-five pounds. The dimensions of girth and length of horned cattle, sheep, calves, and hogs, may be exactly taken in this way, as it is all that is necessary for any computation, or any valuation of stock, and will answer exactly to the four quarters, sinking offal.

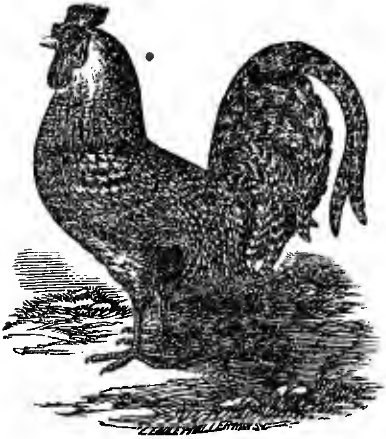
DOMESTIC POULTRY:

THEIR

BREEDS AND TREATMENT

IN

HEALTH AND DISEASE.



THE DOMINIQUE COCK.

DOMESTIC POULTRY.

> "How grateful 'tis to wake
> While raves the midnight storm, and hear the sound
> Of busy grinders at the well-filled rack;
> Or flapping wing or crow of chanticleer,
> Long ere the lingering morn; or bouncing flails
> That tell the dawn is near! Pleasant the path
> By sunny garden wall, when all the fields
> Are chill and comfortless; or barn-yard snug,
> Where flocking birds, of various plume and chirp
> Discordant, cluster on the leaning stack
> From whence the thresher draws the rustling sheaves."

VIEW OF THE IMPORTANCE OF THE SUBJECT.—Poultry-keeping is an amusement in which every body may indulge. The space needed is not great, the cost of food for a few head insignificant, and the luxury of fresh eggs or home-fatted chickens or ducks not to be despised. In a large collection of poultry may be read the geography and progress of the commerce of the world. The peacock represents India; the golden pheasant and a tribe of ducks, China; the turkey, pride of the yard and the table, America; the black swan, rival of the snowy monarch of the lakes, reminds us of Australian discoveries; while Canada and Egypt have each their goose. The large fat white ducks—models of what a duck should be—are English, while the shining green black ones come from Buenos Ayres. And when we turn to the fowl varieties, Spain and Hamburg, Poland and Cochin China, Friesland and Bantam, Java and Negroland, beside Surry, Sussex, Kent, Suffolk, and Lancashire, have each a cock to crow for them.

VARIETIES OF THE DOMESTIC FOWL.—1. The MALAY FOWL, from its size and strength, is admirably adapted for crossing with the Dorking and other native breeds. 2. The JAVA FOWL, nearly resembling, and in the opinion of some, identical with, the Malay. 3. The COCHIN CHINA breed, equal in most respects, and more prolific than the Malay. 4. The SPANISH FOWL, perhaps the best breed known for laying. 5. The POLISH FOWL, a noble and very beautiful bird, and an excellent layer. 6. The SPANGLED VARIETIES, including the whole class of Gold and Silver Spangled, known in different countries as Spangled Hamburgs, Every-day Dutch, Bolton Bays, Bolton Greys, Chittyprats, Creoles, Corals, etc. 7. The SPECKLED and WHITE DORKING, the most delicate of all the varieties for the table. 8. The SUSSEX FOWL, most probably a variety of the Dorking. 9. The GAME FOWL, graceful of form and plumage, with undying courage, and excellent for crossing with common varieties. 10. The PHEASANT FOWL, erroneously said to originate in a cross with the Cock Pheasant. 11. The BANTAMS, more remarkable for their beauty than any other quality.

The Malay Fowl, called also the Chittagong.—This is a large and heavy fowl; it is a close and hard-feathered bird, from which circumstance it often weighs more than it appears to do. It stands tall, with very upright gait. The legs are long, the thighs are remarkably long, strong, and firm; and the tarsi of moderate length, round, stout, and of a yellow color. The tail is long and drooping, the head snake-shaped, *i. e.*, with a great fullness over the eye, and of a flattened form above. The thick comb, scarcely rising from the head, has been compared to half a strawberry; so that the *natural* form of comb a little resembles that of the game-fowl when dubbed. The neck is rope-like and close-feathered, and the bird is almost without wattle.

The Malay should have a pearl eye, and a hawk bill free from stain.

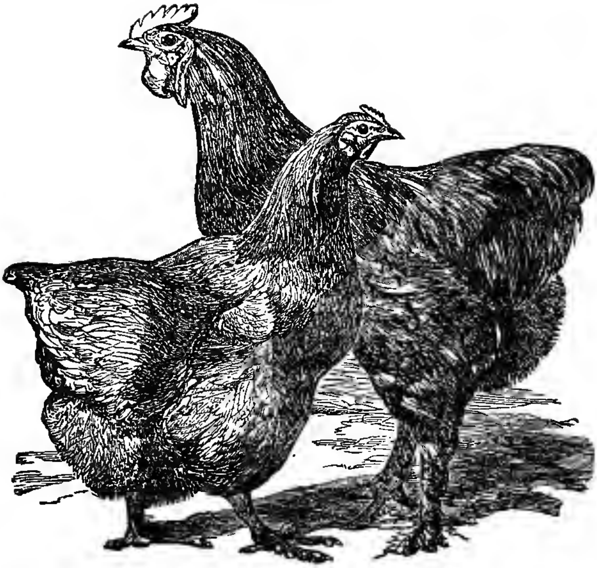
The pullets commence laying early, and are often good winter layers. The egg is of medium size, with a tinted shell. The chickens when half-grown, are gaunt, ungainly looking young things, and, like many choice kinds, fledge slowly.

Height is a great point in a Malay. Old fanciers had a curious mode of comparing notes upon this point. They used to hold the bird out at full stretch, and measure the length, from beak to toe, on a table. Some of old Mr. Castang's breed are mentioned as having measured thirty-eight and a half inches. The cocks are said to have weighed from nine and a half pounds to eleven pounds, and the hens from eight pounds to ten pounds.

I have known a Spanish cock and a Malay hen produce excellent fowls for the table, being large, fleshy, and well-flavored.

The Malays are inveterate fighters; and this is the quality for which they are chiefly prized in their native country, where cock-fighting is carried to the extent of excessive gambling. Men and boys may be frequently met, each carrying his favorite bird under his arm, ready to set to work the moment the opportunity shall occur.

The Cochin China.—The history of the Cochin-China fowl might be the history of the poultry mania, an excitement which rivaled manias of greater importance in its strength. They were introduced some time about the year 1845, and soon became known and popular. Their large size, in the eyes of most persons, their handsome appearance, the brightness of their colors, the number of their eggs, and their gentle, quiet disposition, soon made their way; they were much liked, and were bought eagerly at from three to six dollars each; at that time a very high price for a fowl. Cochin China hens are excellent layers of medium-sized eggs, which they produce in great abundance at the season when they are of greatest value. The chickens, if bred from mature birds, are exceedingly hardy; and the fowls are of quiet, domestic habits, and easily kept within bounds. A first-class fowl should be compact, large, and square-built; full in the chest, deep in the keel, and broad across the loins and hind quarters. The best in form are as compactly made as Dorkings. The head is delicately shaped, with a short bill, and the comb fine in texture, rather small, perfectly single, straight, and equally serrated; the wings small and closely folded in, the tail short, and carried rather horizontally; the legs very short, yellow (according to rule) and heavily feathered. This fowl has, however, lost its earlier popularity, and is now generally discarded by good poulterers, being found a voracious feeder, and yielding a comparatively small return for the food consumed.



COCHIN CHINA, OR SHANGHAI FOWL.

Spanish Fowls.—The chief drawbacks in rearing Spanish are the delicacy of the chickens while young, and the length of time which elapses before the youngsters show their quality, unless they are bred from much better fowls than most persons can command; in which case the chickens develop their prize properties earlier. The combs of the hens shrink very much when they are not laying, and during the moulting season. In winter they should be protected from severe cold, which is very apt to seize the comb and wattles of the cocks.

The hens lay larger eggs than any other kind of fowl we have: they are non-sitters. The chickens hatch out black, with a little mixture of dull white, or yellow. They fledge slowly, and are very delicate while young.

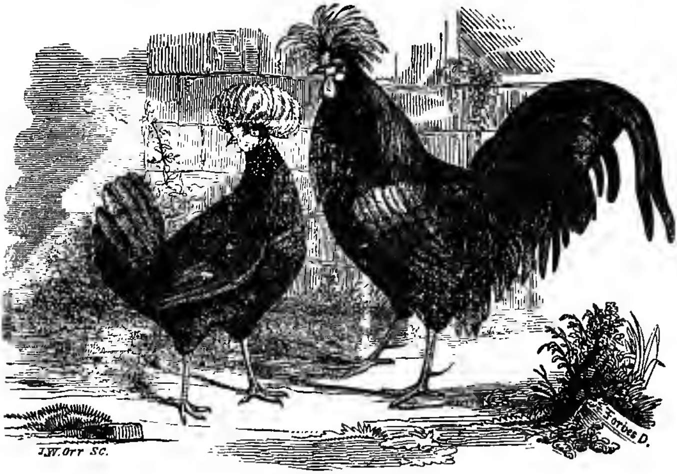
The Minorca.—This is a plump-bodied, useful fowl, which would be a Spanish, if it could persuade its parents to bequeath it the white face which breeders and judges think so much of. The plumage is black, with metallic luster, and the hens lay fine large eggs. I believe they sit more than the Spanish.

The White Spanish.—The white-faced white Spanish I believe to be merely a sport of the white-faced black Spanish. The red-faced white Spanish, or white Andalusian, is really a Spanish fowl. They are good layers, and very precocious. The stock was brought from Spain.

Andalusian Fowls.—The birds which have been shown under this name are in color the kind of gray called blue, which is sometimes laced and shaded with black. Mr. Taylor, late of Shepherd's Bush, imported the original stock from Spain. They are good-looking fowls with large pendent scarlet combs like the Spanish, and are said to be good layers.

THE SPANISH FOWL.

Polands.—With these fowls there has been much difference of opinion respecting the applicability of the name. Some, with apparent reason, would divide them into three families; the St. Jago, the Turkish, and



THE POLISH FOWL.

the Hamburg, or muffed kind. We rank as Polands all fowls with their chief distinguishing characteristic—a full, large, round, compact tuft on the head. It is a class of fowls, the beauty of which, united to their useful qualities, must make general favorites. All the sub-varieties are of medium size, neat compact form, with full plump bodies, full breast, lead-colored legs, and ample tails. The kinds more or less known are very numerous: they are all good layers.

The *White-crested Black Poland* is a fowl of a deep velvety black with a large white tuft on the head. They should be without comb; but many have a little comb in the form of two small points before the tuft. The tuft, to be perfect, should be entirely white; but it is rare to meet with one without a slight bordering of black, or partly black feathers round the front.

The *Golden* and *Silver Polands* are, the one a gold color, the other white spangled with black: the tuft, as in the black, should be large and compact. The more completely the color in the tuft can partake of the character of feather in the rest of the bird, the better. Some persons admit white in the tuft of the golden Poland, but I cannot help thinking the mixture a great fault. Mr. Baily (well known as one of the best judges) would like to see the feathers of the tuft laced. This is very difficult of attainment. The marking of the bird is a black spangle on the golden or silver ground-color. The wings are barred, and the best judges admit lacing on the wing-coverts.

There are several other varieties of tufted fowls or Polands, and many intelligent breeders have devoted great attention to them.

The black and the white are both beautiful, with full tufts, muffs, and clean legs.

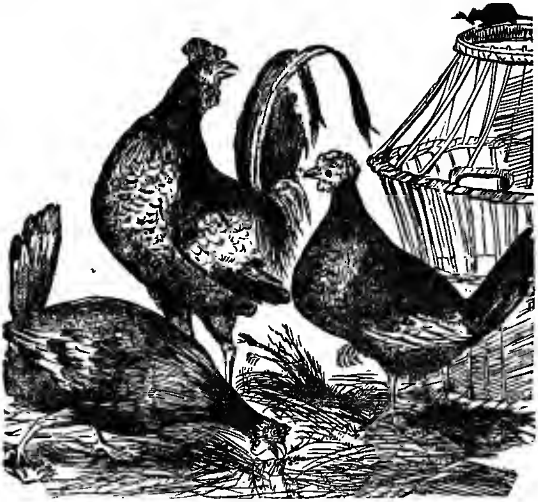
THE GOLDEN SPANGLED HAMBURG FOWL.

Hamburg Fowls.—The Hamburg is a medium-sized fowl, with a brisk and spirited bearing, a brilliantly red double comb, ending in a spike at the back, taper blue legs, ample tail, exact markings, and a well developed white deaf ear. They are profitable fowls to keep, being excellent layers, and not large eaters. They are what pigeon-fanciers would call good field-birds, delighting to wander far abroad, and to seek provender for themselves. The varieties are,

The *Spangled Hamburg*, or pheasant-fowls, the marking of which takes the form of a spot upon each feather. They are divided into gold and silver, according to the ground-color of the plumage.

The *Penciled Hamburg*, in which the marking is more minute. When seen at a distance, the hens have the appearance of being minutely speckled in plumage, and over this a pure white hackle falls and contrasts very prettily. When one feather is taken separately, the marking is veιv exact and beautiful, being a regular penciling; *i. e.*, the feather is divided by bars evenly arranged, of alternate white and gold color. Like the spangled, they are divided into golden and silver for the same reason—the ground-color of the plumage. In all these birds, exactness of the markings is a great point.

The Black Hamburg.—This is a very beautiful variety, being of a brilliant black, with metallic luster. The brilliancy of the plumage, contrasted with the coral-red of the spiked comb and the white ear lobes, renders this fowl so attractive in appearance, that we cannot help wondering that it is not more general, particularly as, like all the Hamburgs, it is an excellent layer.



THE DORKING FOWL.

The Dorking Fowl.—The Dorking would appear to owe its name to its having been chiefly bred in a town of Surry, of the same appellation. That the peculiarity of five toes, or, in other words, of two hind toes instead of one, is to be regarded as a distinctive character of the breed, is by some writers questioned, and by others wholly denied. For my part, I should say, that whenever this characteristic is absent, a cross has been at work.

I do not, however, mean to assert that this possession of two hind toes instead of one, has never occurred in any other family of fowl except those bred at Dorking, in Surry, for Aristotle has mentioned the existence of a similar peculiarity among certain fowl in Greece, and both Columella and Pliny assert the existence of such in their time in Italy, so also does Aldrovand; and these authors lived hundreds of years ago; and, oddly enough, these breeds were remarkable, as are our own Dorking, for being good layers and good sitters.

The color of the Dorking is usually pure white, or spotted or spangled with black; these colors sometimes merge into a gray or grizzle. The hens weigh from seven to nine ponnds; stand low on their legs;

are round, plump, and short in the body; wide on the breast, with abundance of white juicy flesh. The hens are generally good layers, and their eggs, though smaller than the egg of the Spanish and Polish breeds, are of good size and well flavored. These birds have been long prized, and it is now many years since their superiority over our ordinary domestic varieties was originally discovered and appreciated; they were first noticed, and the variety adopted, by the Cumberland breeders, whence they were soon brought into Lancashire and Westmoreland, and gradually spread over all England. Whether, however, from injudicious treatment, or imperfect feeding, or change of climate, or from whatever cause, it is certain that, when met with far from their native place, they appear greatly to have degenerated from their original superiority of character. In this, and all other varieties of fowl, fresh blood should be introduced from time to time, or the breed degenerates.

The best breed of the gallinaceous fowls is the produce of the Dorking (Surry) cock and the common dunghill fowl. This cross is larger and plumper, and more hardy than the pure Dorking, without losing delicacy of flavor or whiteness of flesh.

The characteristics of the pure Dorking are, that it is white-feathered, short-legged, and an excellent layer. The peculiarity of this established variety, which has frequently five claws perfectly articulated (with sometimes a sixth springing laterally from the fifth, but always imperfect), is well known. The crossing with the Sussex fowl has however greatly diminished the monstrosity in the Surry pentadactylus variety. But though the true Dorking, which is white, is much esteemed, that color is rare, and prized for the ornament of the poultry-yard; speckled colors are most generally seen with the higgler.

The Sussex.—This is but an improved variety of Dorking, similar in shape and general character, usually of a brown color, but possessing the advantage of wanting the fifth toe; we say advantage, for the Dorking fowl frequently becomes diseased in the feet, the cocks especially, in consequence of breaking the supplementary toe in fighting.

The Game Fowl.—The game fowl is one of the most gracefully-formed and most beautifully colored of our domestic breeds of poultry; in its form and aspect, and in the extraordinary courage which characterizes its natural disposition, it exhibits all that either the naturalist or the sportsman recognizes as the *beau ideal* of high blood, embodying, in short, all the most indubitable characteristics of gallinaceous aristocracy.

We do not possess any very satisfactory record of the original country of the game fowl; but we are disposed to cede that honor to India, the natives of which country have always been remarkable for their love of cock-fighting; and we also know that there still exists in India an original variety of game cock, very similar to our own, but inferior in point of size. As to the date or occasion of their first introduction into the British islands, we know nothing certain; but it is probable that we owe it to the invasion of Julius Cæsar, the Romans having been very fond of the sport of cock-fighting.

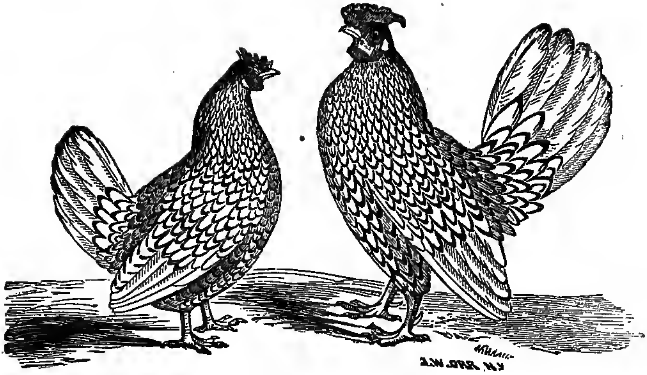
It is not only for its pugnacious qualities that the game fowl is to be noticed; it yields to no breed, nay, perhaps is superior to most, in the

THE GAME COCK AND HEN.

whiteness and sapidity of its flesh; the hens are excellent layers, and the eggs, though of moderate size only, are remarkable for the delicacy of their flavor. The game cock is very attentive to his female train, and ever ready to do battle in their defense; but not unfrequently he becomes savage and dangerous. A blow with his spur is no trifle. Children have been severely injured, and cases have been mentioned in which they have been killed. From these causes, and from the fact that the young broods, as soon as fairly feathered, begin to fight among themselves with desperate determination, blinding each other, stripping the skin from each other's heads and necks, and killing each other on the spot, many persons object to keep this breed; and it must be confessed that it occasions great trouble; it is not always convenient or possible to separate the young broods; and as the young cocks and hens fight indiscriminately, it not unfrequently happens that one-half is destroyed in the *mêlée*, while most of the survivors are so mangled as to render it necessary to put them out of pain, to the mortification of the farmer or breeder of fowls for profit; for not only are the broods lost, but the time also.

Of all breeds, the game breed is the most beautiful, whether we look to contour or coloring; the game cock carries himself proudly, and yet gracefully; his port and bearing proclaim his fiery spirit and undaunted mettle, which endure even to his last breath; for while prostrate and mortally wounded, he will answer the insulting crow of his victorious rival, and make a last effort to revenge himself before the spark of life is extinct. No wonder that the gallant cock should have been chosen as the emblem of courage.

Bantams.—The classes of Bantams are gold-laced, silver-laced, white, black, and one for "any other variety;" from which last may especially be selected the exceedingly beautiful game Bantams, and the once popular, but now rare, booted sub-variety. Diminutive size and bold carriage are important points in all Bantams; in other respects, the different kinds differ as much as distinct varieties of fowls can do. The Bantams are peculiarly fancy fowls; they have been accused of not being a useful kind, as of course there is little to eat in a fowl which, when full grown, should weigh, the cock about a pound, the hen less, the eggs



THE SEABRIGHT BANTAM.

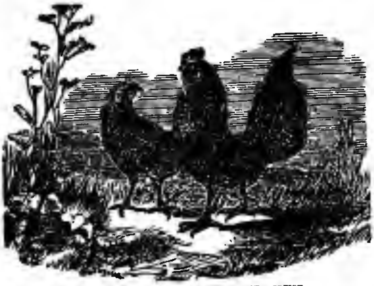
being small in proportion. But how many hundreds of amateurs there are whose opportunities give them no room for full-sized fowls, but who, delighting in living things, can indulge their fancy and beguile many hours which would otherwise prove weary ones, by keeping a few Bantams. Their small eggs are delicacies which would tempt almost any invalid.

WHITE BANTAM COCK AND HEN.

The *gold and silver-laced, or Seabright Bantam*, is perhaps the most popular kind of all The size should be quite diminutive, and the carriage saucy.

The *booted Bantam*, of which the most beautiful we have seen have been pure white, are completely feathered on the legs—not feathered down one side only, like the Cochin China.

Game Bantams are exact miniature representatives of game fowls, black-breasted reds, duck-wings, and other colors. An exact duck-wing game Bantam is the most beautiful little creature one can imagine.



BLACK BANTAM COCK AND HEN.

THE DOMESTIC TURKEY.—The domestic turkey can scarcely be said to be divided, like the common fowl, into distinct breeds, although there is, indeed, considerable variation in color, and also in size. The finest and strongest turkeys are said to be those of a bronzed black, resembling as closely as possible the original stock; they are reared the most easily, are large, and fatten rapidly. Some turkeys are of a coppery tint, others of a delicate fawn-color, others particolored, gray, and white, and some few of a pure snowy white. All these are considered inferior to the black; their color indicates something like degeneracy of constitution, and they are seldom very large-sized.

In the choice of store-birds some care is requisite; the stock should be of a good sort; the black Norfolk race is an excellent sort, probably produced originally by a cross with the wild breed of America.

Early in spring, generally speaking, the female commences laying; she indicates her intention by a peculiar cry, by strutting about with an air of self-satisfaction, and often by prying into out-of-the-way places. She should now be closely watched, and some management is required to induce her to lay in the place desired.

The nest should be prepared of straw and dried leaves; it should be secluded; and to excite her to adopt it, an egg, or a piece of chalk cut into the form of an egg, should be placed in it. When her uneasiness to lay is evident, and symptoms prove that she is ready, she should be confined in the shed, barn, or place in which her nest (in a large wicker basket) is prepared, and let out as soon as the egg is laid. It is generally in the morning that the turkey-hen lays, and mostly every other day, though some lay daily, until the number of eggs amounts to from fifteen to twenty. As the eggs are laid, it is as well to remove them (leaving the decoy egg or piece of chalk) until the number is complete; as they are liable to be broken, or to be sucked by rats or weasels. They may then be restored to her for incubation. The turkey-hen is a steady sitter, and in this respect resembles the wild bird; nothing will induce her to leave her nest; indeed, she often requires to be removed to her food, so overpowering is her instinctive affection. She must be freely supplied with water within her reach; should she lay any eggs after she has commenced incubation, these should be removed: it is proper, therefore, to mark those which were given to her to sit upon. The hen should on no account be rashly disturbed; no one except the person to whom she is accustomed, and from whom she receives her food, should be allowed to go near her, and the eggs, unless circumstances imperatively require it, should not be meddled with.

On the twenty-sixth day, according to some on whom dependence may be placed (the thirty-first according to others), the chicks leave the eggs.

The treatment of the chick now requires attention. As in the case of young fowls, the turkey chicks do not require food for several hours. It is useless to cram them, as some do, fearing lest they should starve; and besides, the beak is as yet so tender that it runs a chance of being injured by the process. When the chicks feel an inclination for food, nature directs them how to pick it up. There is no occasion for alarm, if for many hours they content themselves with the warmth of their parent, and enjoy her care only. Yet some food must be provided for them, and this should be, of course, suited to their nature and appetite. Here, too, let the simplicity of nature be a guide. We say this, because some have recommended spices, wine, and even bathing in cold water.

The first diet offered to turkey chicks should consist of eggs boiled hard and finely minced, or curd with bread crumbs, boiled nettles, and the green part of onions, parsley, etc., chopped very small, and mixed together, so as to form a loose crumbly paste. Barley or oatmeal, kneaded with a little water, and mixed with the pulp of potatoes and Swedish turnips, to which chopped beet-leaves are added, may also be given. They will require water; but this should be put into very shallow vessels, so as to insure against the danger of the chicks getting wet. Fresh milk is apt to disagree with the young birds, and is not needful. Both the turkey-hen and her chickens should be housed for a few days; they may then, if the weather be fine, be allowed a few hours' liberty during the day; but should a shower threaten, they must be put immediately under shelter. This system must be persevered in for three or four weeks. By this time they will have acquired considerable strength, and will know how to take care of themselves. On the first drops of a shower, they will run for shelter into their accustomed place of refuge, which should be warm and waterproof. As they get older, meal and grain may be given them more freely. They now begin to search for insects, and to dust their growing plumage in the sand. At the age of about two months, or perhaps a little more, the males and females begin to develop their distinctive characteristics. In the young males the carunculated skin of the neck and throat, and the horn-like contractile comb on the forehead, assume a marked character. This is a critical period. The system requires a full supply of nutriment, and good housing at night is essential. Some recommend that a few grains of cayenne pepper, or a little bruised hempseed, be mixed with their food. The distinctive sexual marks once fairly established, the young birds lose their names of *chicks* or *chickens*, and are termed *turkey poults*. The time of danger is over, and they become independent, and every day stronger and more hardy. They now fare as the rest of the flock, on good and sufficient food, if their keeper is alive to his own interest. I again repeat it, that a man who keeps poultry on meagre, spare, innutritious diet, will never rear fine poultry, and never repay himself even for his niggardly outlay. Poultry should never be in bad condition: let them not be kept at all, unless they are kept properly.

THE WILD TURKEY is a noble bird, far exceeding its domestic relative in neatness of form and beauty. Crosses in America often take place between the wild and tame races, and are highly valued, both for external qualities and for the table. In districts where the wild turkey is common, such crosses are quite frequent; the wild male driving away his domesticated rival, and usurping the sultanship of the seraglio Eggs of the wild turkey have frequently been taken from their nests, and hatched under the tame hen. The young preserve a portion of their uncivilized nature, and exhibit some knowledge of the difference between themselves and their foster-mother, roosting apart from the tame ones. and in other respects showing the force of hereditary disposition. The domesticated young reared from the eggs of the wild turkey are often employed as decoy-birds to those in a state of nature. Mr. William Bloom, of Clearfield, Pennsylvania, caught five or six wild turkeys when quite chickens, and succeeded in rearing them. Although sufficiently tame to feed with his tame turkeys, and generally associate with them, yet they always retained some of their original propensities, roosting by themselves, and higher than the tame birds, generally on the top of some tree, or on the house. They were also more readily alarmed. On the approach of a dog they would fly off, and seek safety in the woods. On an occasion of this kind, one of them flew across the Susquehanna, and the owner was apprehensive of losing it. In order to recover it, he sent a boy with a tame turkey, which was released at the place where the fugitive had alighted. This plan was successful. They soon joined company, and the tame bird induced his companion to return home. Mr. Bloom found occasion to remark that the wild turkey will thrive more and keep in better condition than the tame turkey, on the same quantity of food.

The native country of the wild turkey extends from the northwestern territory of the United States to the Isthmus of Panama, south of which it is not to be found, notwithstanding the statements of authors, who have mistaken the curassow for it. In Canada, and the now densely-peopled parts of the United States, wild turkeys were formerly very abundant, but, like the Indian buffalo, they have been compelled to yield to the destructive ingenuity of the white settlers, often wantonly exercised, and seek refuge in the remotest parts of the interior. Although they relinquish their native soil with slow and reluctant steps, yet such is the rapidity with which settlements are extended, and condensed over the surface of this country, that we may anticipate a day, at no distant period, when the hunter will seek the wild turkey in vain.

The wooded part of Arkansas, Louisiana, Tennessee, and Alabama; the unsettled portions of the states of Ohio, Kentucky, Indiana, and Illinois; the vast expanse of territory northwest of these states, on the Mississippi and Missouri, as far as the forests extend, are more supplied than any other parts of the Union with this valuable game, which forms an important part of the subsistence of the hunter and traveler in the wilderness. It is not probable that the range of this bird extends to or beyond the Rocky Mountains. The Mandan Indians, who a few years ago visited the city of Washington, considered the turkey one of the greatest curiosities they had seen, and prepared a skin of one to carry home for exhibition.

In Florida, Georgia, and the Carolinas, the wild turkey is not common, and still less so in the western parts of Virginia and Pennsylvania. Some, however, are said to exist in the mountainous districts of Sussex county, New Jersey.

The wild turkey is irregularly migratory, as well as irregularly gregarious. Whenever the forest fruits (or mast) of one portion of the country greatly exceed those of another, thither are the turkeys insensibly led, by gradually meeting in their haunts with more fruit, the nearer they advance toward the place in which it is most plentiful. Thus, in an irregular manner, flock follows flock, until some districts are deserted, while others are crowded with an influx of arrivals. "About the beginning of October," says Audubon, "when scarcely any of the seeds and fruits have fallen from the trees, these birds assemble in flocks, and gradually move toward the rich bottom-lands of the Ohio and Mississippi. The males, or, as they are more commonly called, the *gobblers*, associate in parties of from ten to a hundred, and search for food apart from the females; while the latter are seen either advancing singly, each with her brood of young, then about two-thirds grown, or in union with other families, forming parties, often amounting to seventy or eighty individuals, all intent on shunning the old cocks, which, when the young birds have attained this size, will fight with and often destroy them by repeated blows on the head. Old and young, however, all move in the same course, and on foot, unless their progress is interrupted by a river, or the hunter's dog force them to take wing.

"When they come upon a river, they betake themselves to the highest eminences, and there remain often a whole day, and sometimes two, as if for the purpose of consultation. During this time the males are heard gobbling, calling, and making much ado, and are seen strutting about, as if to raise their courage to a pitch befitting the emergency. Even the females and young assume something of the same pompous demeanor, spread out their tails, and run round each other, purring loudly, and performing extravagant leaps. At length, when the weather appears settled, and all around is quiet, the whole party mount to the tops of the highest trees, whence at a signal, consisting of a single cluck, given by a leader, the flock takes flight to the opposite shore. The old and fat birds easily get over, even should the river be a mile in breadth, but the younger and less robust frequently fall into the water—not to be drowned, however, as might be imagined; they bring their wings close to their bodies, spread out their tails as a support, stretch forward their necks, and striking out their legs with great vigor, proceed rapidly toward the shore; on approaching which, should they find it too steep for landing, they cease their exertions for a few moments, float down the stream till they come to an accessible part, and by a violent effort generally extricate themselves from the water. It is remarkable that, immediately after crossing a large stream, they ramble about for some time as if bewildered. In this state they fall an easy prey to the hunter.

"When the turkeys arrive in parts where the mast is abundant, they separate into smaller flocks, composed of birds of all ages and both sexes, promiscuously mingled, and devour all before them. This happens about the middle of November. So gentle do they sometimes become after these long journeys, that they have been seen to approach the farm-houses, associate with the domestic fowls, and enter the stables and corn-cribs in quest of food. In this way, roaming about the forests, and feeding chiefly on mast, they pass the autumn, and part of the winter."

The season of courtship begins about the middle of February. The females now separate from the males, whom they endeavor to shun, but by whom they are perseveringly followed.

It is generally about the middle of April that the female begins to select a site, and arrange her rude nest, which consists chiefly of withered leaves, in some depression on the ground, amidst dense brushwood, or in such an obscure place as the locality affords. The eggs, like those of the domestic bird, are of large size, and of a dull cream-white, minutely freckled or dotted with reddish-brown; their average number varies from ten to fifteen. While the gradual addition of egg to egg is going on, the hen displays surprising instinctive caution. On leaving her charge, she is careful to cover the whole with dry leaves, so artfully disposed as to render it difficult, even for one who has watched her movements, to find the nest; and on returning to it she varies her rout, scarcely ever returning to it twice by the same course. Hence it is mostly by accident that the nest of the hen is discovered. It not unfrequently happens that several hens associate together and form a common nest, probably for mutual aid and assistance, and rear their broods together. Audubon says that he once found three hens sitting on forty-two eggs. In such cases one of the females at least is ever on guard, no raven or crow then daring to invade the nest. While in the act of incubation, the hen is not readily driven from her nest by the appearance of danger. A person walking carelessly along as if taking no particular notice, may pass a nest within five or six paces, the female crouching low to avoid observation; but, as Mr. Audubon has ascertained, if a person make his approach in a stealthy searching manner, she will quit it while he is yet thirty yards distant, and assuming a stately gait, will move away, uttering every now and then a clucking note, probably hoping by this means to draw off the intruder and baffle his search. The same writer says that the hen seldom or never abandons her nest if it has been discovered by man, but that if a snake or any other animal has sucked any of the eggs, she leaves it altogether. Under such circumstances, or when the eggs have been removed, she seeks the male, and recommences the preparation of another nest; but, as a rule, she lays only a single batch of eggs during the season. When the eggs are on the eve of hatching, the female will not leave her nest under any circumstances while life remains; she will even allow an inclosure to be made around her, and thus be, as it were, imprisoned, rather than seek her own safety by flight.

Before leaving the nest with her young brood, the female shakes herself, adjusts her plumage, and appears roused to the exigencies of the occasion; she glances upward and around her, in the apprehension of enemies, and as she moves cautiously along, keeps her brood close about her; her first excursion is generally to a little distance only from the nest, to which she returns with her brood at night. Subsequently they wander to a greater distance, the hen leading her charge over dry undulating grounds, as if aware of the danger of damp and humid spots. Wet, indeed, is fatal to young turkeys while covered only with down; hence, in very rainy seasons the brood becomes greatly thinned, for the young, if once completely wetted, seldom recover; their vital energies sink under the abstraction of caloric during evaporation.

At the age of a fortnight, the young birds begin to use their wings; hitherto they have rested on the ground, but now they begin to roost on the low branch of some large tree, crowding close to each side of the mother, and sheltered beneath her broad wings. They now wander about more freely, visiting the glades and open lands bordering the woods, in search of wild strawberries and other fruits, grasshoppers, the larvæ of ants and other insects; and roll themselves in the sand and dust, in order to clear their glowing feathers of loose scales and parasitic vermin: deserted ants' nests are favorite dusting-places.

By the month of August, the young birds acquire considerable growth, and use their wings and legs with great vigor and readiness, so that they are able to escape the sudden attack of foxes, lynxes, and other beasts of prey, by rising quickly from the ground and mounting the tallest branches of trees. The young cocks now begin to show their distinctive characteristics, and even to utter an imperfect gobble, while the young hens pur and leap. Several broods flock together, and so continue united, till after the October migration, and through the winter, when the males leave the females.

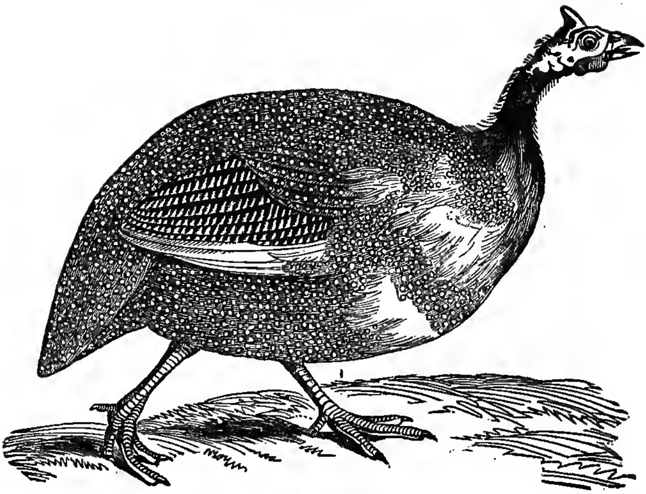
Turkeys, though extremely delicate in their infancy, become very hardy, and, if permitted, will roost on the highest trees, in the cold dry nights of winter, without suffering injury. The hen, which lays many eggs early in spring, sits thirty days, and covers from twelve to fifteen eggs. It is unnecessary for the turkey cock, as is the case with gallinaceous fowl, to be in constant intercourse with the hen during her period of laying. Two visits from him in that season are sufficient to impregnate all the eggs. She is a very steady sitter, and must be removed to her food and supplied with water, for she would never leave her nest. She wants the alertness and courage and sagacity of the common hen, and might be called a fool with much more propriety than the goose, which is an intelligent bird. The turkey hen is incapable of teaching her young ones how to pick up their food, on which account a poultry-maid should always attend them until they are reared.

The author of "*Tabella Cibaria*" proves it upon the bird that it is "so stupid or timorous that if you balance a bit of straw on his head, or draw a line of chalk on the ground from his beak, he fancies himself loaded, or so bound that he will remain in the same position till hunger forces him to move. We made the experiment." We never did; but we doubt it not, though we cannot accept it as a proof of stupidity. How much wit may be necessary to balance a straw may be doubtful; but gallant chanticleer has never been charged either with fear or folly, and yet you have only to take him from his perch, place him on the table by candle-light, hold his beak down to the table, and draw a line with chalk from it, so as to catch his eye, and there the bird will remain spell-bound, till a bystander, rubbing out the line, or diverting his attention from it, breaks the charm. Many a fowl have we fascinated in our boyish days.*

The Guinea-Fowl.—The Guinea-fowl is slightly larger than the ordinary barn-door fowl, but is inferior in size to the larger foreign breeds, as the Malay and Spanish; in both aspect and character it appears to occupy a position between the pheasant and the turkey. Although long familiarized, the Guinea-fowl has never been fully domesticated, still retaining much of the restlessness and shyness of its primitive feral habits. It is very courageous, and will not only frequently attack the turkey, but even prove victorious in the encounter.

The cock and hen are so nearly alike, that it is not easy to distin-

* "*Tabella Cibaria.*"



THE GUINEA-FOWL.

guish them; there is sometimes a difference of hue in certain parts; but this difference only occurs occasionally, and indeed it is on gait, voice, and demeanor that we must chiefly depend. It must be remarked that they pair; therefore a second hen will be neglected and useless except for eggs.

Like all the gallinaceous birds, the Guinea-fowl is esteemed for its flesh and its eggs, which, though smaller than those of the common fowl, are very excellent and numerous, the hen commencing to lay in the month of May, and continuing during the entire summer. After the pheasant season, young birds of the year are, on the table, by no means unworthy substitutes for that highly-prized game. Such birds are acceptable in the London market, and fetch a fair price. The Guinea-fowl is of a wild, shy, rambling disposition; and, domesticated as it is, it pertinaciously retains its original habits, and is impatient of restraint. It loves to wander along hedgerows, over meadows, through clover or corn fields, and amidst copses and shrubberies; hence these birds require careful watching, for the hens will lay in secret places, and will sometimes absent themselves entirely from the farm-yard until they return with a young brood around them. So ingeniously will they conceal themselves and their nest, so cautiously leave it and return to it, as to elude the searching glance of boys well used to bird-nesting; but it may always be found from the watchful presence of the cock while the hen is laying. There is one disadvantage in this, the bird will sit at a late period, and bring forth her brood when the season begins to be too cold for the tender chickens. The best plan is, to contrive that the hens shall lay in a quiet secluded place, and to give about twenty of the earliest eggs to a common hen ready to receive them, who will perform the duties of incubation with steadiness. In this way a brood in June may be easily obtained. The young must receive the same treatment as those of the turkey, and equal care; they require a mixture of boiled vegetables, with curds, farinaceous food, as grits, barley-meal, etc.; they should be induced to eat as often and as much as they will. In a short time they begin to search for insects and their larvæ; and with a little addition to such fare as this, and what vegetable matters they pick up, will keep themselves in good game condition, without cramming or overfeeding. For a week or two before being killed for the table, they should have a liberal allowance of grain and meal.

Guinea-fowls mate in pairs; overlooking this circumstance frequently occasions disappointment in the broods. The period of incubation is twenty-six days. Though they are not unprofitable birds, as they are capable of procuring almost entirely their own living, they are rejected by many on account both of their wandering habits, which give trouble, and their disagreeable voice, resembling the noise of a wheel turning on an ungreased axletree.

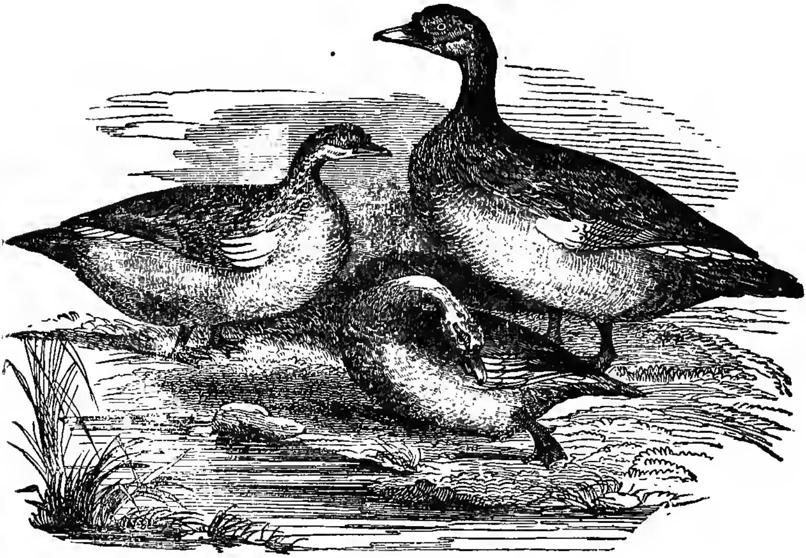
THE PEA-FOWL.—A peacock in full feather, parading on a green lawn, or from the extremity of a terrace-wall, displaying the full length of his gorgeous tail, is one of the most beautiful living additions to garden landscape. But of fruit he will prove a devourer, not to be guarded against, and both he and his mate are not unfrequently murderous assassins of the young of other fowl.

In domestication it is a rambling bird, unsuited to confined premises; it requires lawns, shrubberies, and wide pleasure-grounds, to which it is an appropriate ornament, whether it moves about with its tail expanded, or walks trailing it along down avenues of smooth turf, or amongst the woodland glades. Semi-wild as the peacock is, it is disposed to become familiar, and if encouraged will visit the windows of the house, in order to receive an accustomed dole of bread, and when displaying its plumage seems to be aware of the admiration it inspires.

Grain of various kinds, mast, fruits, insects and their larvæ, together with small reptiles, constitute its food. It is not until the third year that the male acquires his glorious plumage; the aigrette on the head in this species (but not in the Japan peafowl) is composed of miniature plumes similar to those of the train. The tarsi are spurred, and when irritated, the peacock can use them with full effect.

For roosting, the peacock affects still higher branches than the turkey, and, failing these, the gable end of a house or barn, or some elevated situation; and here, through summer and winter will it take its station, defying the rain and the cold. Strange that a bird originally from India should be so hardy! It would seem as if Providence had expressly given to the gallinaceous birds that quality of constitution which fits them for accompanying man into regions far remote from their natural *habitat.* Such is the case, indeed, with all animals essentially subservient to his welfare; and we cannot but see in this fact a proof of the wisdom and goodness of that God who commanded man "to replenish the earth and subdue it."

Though the peafowl roosts in trees, the female incubates on the ground, making in her natural state a rude, inartificial nest, in some secluded spot, under cover of the dense jungle. The eggs vary in number from five to ten. This concealment, as in the instance of the turkey, is necessary; for, actuated by a strange jealousy, the male will break all the eggs if he discovers them; and this feeling actuates our domestic birds, insomuch that the female, during incubation, must be placed in such security as to prevent the access of the male to the nest. Eggs, grayish white; period of incubation, from twenty-seven to thirty days.



MUSK OR BRAZILIAN DUCKS.

THE DOMESTIC DUCK.—Ducks cannot be kept to advantage unless they can have access to water. This need not be in large quantities. A tub, holding a few gallons, set in the ground, and daily renewed, answering for a large flock. They are gross feeders, and excellent "snappers up of unconsidered trifles." Nothing comes amiss to them: green boiled vegetables, the waste of the kitchen, meal of all sorts made into paste, grains, bread, animal substances, worms, slugs and snails, insects and their larvæ, are all accepted with eagerness. Their appetite is not fastidious; in fact, to parody the line of a song, "they eat all that is luscious, eat all that they can," and seem determined to reward their owner by keeping themselves in first-rate condition, if the chance of so doing is afforded them. They never need cramming—give them enough and they will cram themselves; yet they have their requirements and ways of their own, which must be conceded. Confinement will not do for them: a paddock, an orchard, a green lane, and a pond; a farm-yard, with barns and water; a common, smooth and level, with a sheet of water, abounding in the season with tadpoles and the larvæ of aquatic insects,—these are the localities in which the duck delights, and in such they are kept at little expense. They traverse the green sward in

Indian file (an instinctive habit still retained), and thus return at evening to their dormitory, or emerge from it to the edge of the pond or sheet of water, over which they scatter themselves; thus also they come to the call of their feeder.

Ducks should always have a lodging-place of their own; they should be separated from fowls, and never housed beneath their perches; yet where fowls are kept, a little contrivance would suffice to make them a comfortable berth in a fowl house. In winter, a thin bedding of straw, rushes, or fern-leaves, should be placed on the floor of their dormitory, and changed frequently. More than four or five females should not be allowed to a single drake. The duck lays a great many eggs in the season; there are instances in which one has laid as many as eighty-five eggs; but these cases are rare; the female will cover with comfort twelve or fourteen, and in most cases is a steady sitter. When she inclines to sit, give her a plentiful nest, with some broken straw or hay near at hand, with which to cover the eggs when she leaves them; as nature instructs her to use this precaution, no doubt it is best to give her the opportunity. Let her be supplied with food and water directly she leaves her nest; and if she choose to take a bath it will do no harm. It is common to put ducks' eggs under hens, and it is ludicrous, though somewhat painful, to see the trepidation and anxiety of the foster-mother on the edge of a pond, into which the young ducks have plunged, regardless of her feelings and incessant clucking, a language they do not understand. At what age young wild ducks are taken by their parents into the water we cannot say; but this is certain, that if young tame ducks visit the water too early, they are very apt to become cramped and perish. If very young ducklings once become *saturated* with water, they invariably perish; they are in this respect as tender as young turkeys. Ducks, although they float on the water, never become wet (that is, when properly fledged), for their plumage throws off the fluid, and they return dry from the pond; but ducklings, while yet in the down, get wet, and should therefore have sparing access to water until the feathers supply the place of the early down. Young ducks are easily reared, being fed on meal mixed with potatoes and green meat boiled; they are useful in gardens, which they clear of slugs and snails, without injuring the crops of vegetables. As a caution, we would here observe, that the ponds to which they are allowed access should contain neither pike nor eels; and rats should be extirpated. Rats and weasels often thin flocks of ducklings, to the great loss and vexation of their owner.

The Varieties of the Domestic Duck, are *the White Aylesbury*, large, plumage perfectly white, feet yellow, and a flesh-colored bill. This is one of the best varieties. *The Rouen duck*, a large dark colored variety, is also highly esteemed. The *Hook-billed*, remarkable for the peculiar form of its beak. The *Penguin duck*, which walks, or waddles in an upright position, like the penguin; the *Musk duck*, so termed from the strong scent of musk which its skin exhales. This duck is of large size, and its plumage of a glossy blue-black. The *East Indian*, or *Buenos Ayres duck*, is a small and very beautiful variety, black, with a brilliant metallic luster on the feathers. These, and the various colored call-ducks, are highly ornamental.

The egg of the duck is by some people very much relished, having a rich piquancy of flavor, which gives it a decided superiority over the egg of the common fowl; and these qualities render it much in request with the pastry-cook and confectioners—three duck eggs being equal in culinary value to six hen eggs. The duck does not lay during the day, but generally in the night; exceptions regulated by circumstances, will, of course, occasionally occur. While laying, the duck requires more attention than the hen, until she is accustomed to resort to a regular nest for depositing her eggs—once, however, that this is effected, she will no longer require your attendance.

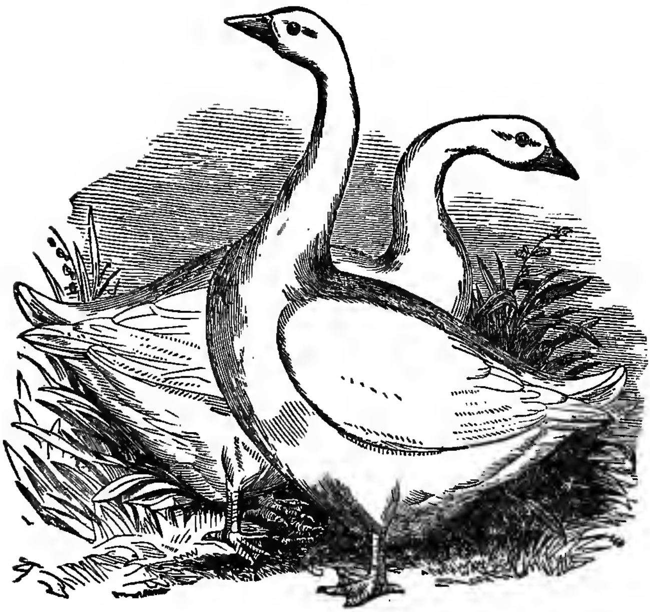
THE DOMESTIC GOOSE.—The best variety of the domestic goose is that which varies least in color. Gray is the best color. Mixed colors should be rejected.

As to breeding geese. These birds, as has been ascertained by M. St. Genis, will pair like pigeons; and even if the number of ganders exceeds that of the geese, no noise or riot takes place, mutual choice being evidently the ruling principle. Amongst other experiments tried by M. St. Genis, he left, besides the patriarch of the flock, two of the young ganders, unprovided with mates, but still those couples that had paired kept constantly together, and the three single ganders never attempted to approach any of the females during the temporary absence of their lords. M. St. Genis also remarked, in the course of his observations, that the gander is more frequently white than the goose.

The goose deposits from ten to twenty eggs at one laying; but, if you do not desire her to sit, you may, by removing the eggs as fast as they are laid, and at the same time feeding her highly, induce her to lay on from forty-five to fifty. This is, however, unusual, and it is unprofitable. When tolerably well cared for, geese may be made to lay, and even hatch, three times in the year. This care consists merely in high feeding and good housing early in the spring, so as to have the first brood early in March; but we would rather have two good broods reared than three bad ones, and we are, therefore, more disposed to recommend patience and moderation.

The goose will, when left to the unassisted promptings of nature, begin to lay about the latter end of February, or the beginning of March. The commencement of the laying may be readily foreseen by marking such geese as run about carrying straws in their mouth. This is for the purpose of forming their nest, and these individuals are about to lay. They should, then, of course, be watched, lest they drop their eggs abroad. Once a goose is shut up, and compelled to lay her first egg of that laying in any particular nest, you need be at no further trouble about her; for she will continue to lay in that spot, and will not stray on any account elsewhere.

We can always detect the inclination of the goose to sit or hatch. This is known by the bird keeping in the nest after the laying of each egg longer than usual. The hatching nest should be formed of straw, with a little hay as a lining; and so formed that the goose will not fling the eggs over the side when in the act of turning them. You need not banish the gander; on the contrary, let him remain as near the nest as he chooses; he will do no mischief, but will act the part of a most vigi-



EMBDEN OR BREMEN GEESE.

lant guardian. About fifteen eggs will be found as many as a good sized goose can properly cover. Do not meddle with the eggs during the incubation, and do not meddle with the goose; but, as she is somewhat heavier than the hen, you may leave her food and drink rather nearer to her than is necessary with common poultry, as, if she chanced to absent herself from the eggs sufficiently long to permit them to cool, she might become disheartened, and desert her task altogether. It is, however, unnecessary to put either vinegar or pepper in her food or water, as recommended by some, or, in short, to meddle with her at all.

The goose will sit on her eggs for nearly two months; but the necessary period of incubation being but one, the early hatched goslings must be removed lest the more tardy might be deserted. About the twenty-ninth day the goslings begin to chip the shell; and if their own powers prove inadequate to their liberation, aid may be rendered them, and that, also, with much less risk than in the case of other young birds, the shell and its membranes being very hard and strong, and the young themselves also hardy, and capable early of enduring hardship. The best plan is to have the eggs set, of as nearly as possible equal freshness, that they may be hatched at one time.

On first being hatched, turn the goslings out into a sunny walk, if the weather will permit of such procedure; but do not try to make them feed for, at least, twelve hours after leaving the shell. Their food may then be bread soaked in milk, porridge, curds, boiled greens, or even bran, mixed with boiled potatoes, taking care not to give the food in too hot a state, while you equally avoid giving it cold. Avoid rain or cold breezes; and see, therefore, that the walk into which you turn the young goslings be sheltered from both wind and weather. The goslings should also be kept from water for at least a couple of days after hatching. If suffered too early to have free access to water, they are very liable to take cramp—a disease which generally produces permanent lameness and deformity, and but too frequently proves fatal.

Geese should have an inclosed court or yard, with houses in which they may be shut when occasion requires. It is better, however, to confine them as little as possible; and, by suffering them to stroll about, and forage for themselves, the expense of rearing them will fall comparatively lightly on you, so that you will not be conscious of any outlay. Geese require water, and cannot be advantageously kept when they cannot have access to it; still, however, we have known them to thrive where they had no access to any pond or river, but had only a small artificial pool, constructed by their owners, in which to bathe themselves. When geese are at all within reach of water, they will, when suffered to roam at liberty, usually go in search of, and discover it, and will, afterward, daily resort thither. Though the birds are thus fond of water, all damp about their sleeping places must be scrupulously guarded against. Grass is as necessary to the well-being of geese as water; and the rankest, coarsest grasses, such as are rejected by cattle, constitute the goose's delicacy.

THE WILD GOOSE.—Canada Goose, or Cravat Goose (*Anser Canadensis*), *Neeseash* and *Mistehayneeseah* of the Cree Indian, *Wild Goose* of the Anglo-Americans. Hearne, Wilson, Audubon, Bonaparte, and others have given us full accounts of the habits and manners of the Canada goose in a state of nature. It is the common wild goose of the United States, and its regular periodical migrations are the sure signals of returning spring, or of approaching winter. The tracts of their vast migratory journeys are not confined to the sea-coast or its vicinity, for, in their aerial voyages to and from the north, these birds pass over the interior on both sides of the mountains, as far west, at least, as the Osage River. "I have never," says Wilson, "yet visited any quarter of the country where the inhabitants are not familiarly acquainted with the regular passing and repassing of the wild geese." It is an opinion in the states that they visit the lakes to breed. Most, however, it would appear, wing their way much farther northward, for from the Canadian lakes they migrate to still higher latitudes on the setting in of spring. Hearne saw them in large flocks within the arctic circle, pushing their way still northward. Captain Phipps observed them on the coast of Spitzbergen, in latitude 80° 27′ N. Audubon found them breeding on the coast of Labrador, and states that the eggs, six or seven in number, of a greenish white, are deposited in a roughly made nest. Bonaparte states that they breed everywhere throughout the Hudson's Bay territory, and have been observed in the middle of July on the Copper-mine river, not far from its debouchure, accompanied by their newly-hatched young. The cry of the species is imitated by a nasal repetition of the syllable *wook*, or, as Wilson writes it, *honk*.

The destruction of the Canada geese during their migrations is enormous: the autumnal flight lasts from the middle of August to the middle of October; those which are taken in this season, when the frosts begin, are preserved in their feathers, and left to be frozen for the fresh provisions of the winter stock. The feathers constitute an article of commerce, and are sent to England. The vernal flight of these geese lasts from the middle of April until the middle of May. Their arrival in the fur countries from the south is impatiently expected; it is the harbinger of spring, and the month is named by the Indians the goose-moon. Dr. Richardson, in his *Fauna Boreali-Americana*, describes as follows the interest caused by the appearance of the flocks:—"The arrival of this well-known bird is anxiously looked for and hailed with great joy by the natives of the woody and swampy districts, who depend principally on it for subsistence during the summer. It makes its first appearance in flocks of twenty or thirty, which are readily decoyed within gunshot by the hunters, who conceal themselves and imitate its call. Two, three or more are so frequently killed at a shot, that the usual price of a goose is the single charge of ammunition. One goose, which when fat weighs about nine pounds, is the daily ration of one of the Company's servants during the season, and is reckoned equivalent to two snow-geese (*Anas hyperborea*), or three ducks, or eight pounds of buffalo and moose-meat, or two pounds of pemmican, or a pint of maize and four ounces of suet.

"About three weeks after their first appearance, the Canada geese disperse in pairs throughout the country, between the fiftieth and sixty-seventh parallels, to breed, retiring at the same time from the shores of Hudson's Bay. They are seldom or never seen on the coasts of the arctic sea. In July, after the young birds are hatched, the parents moult, and vast numbers are killed in the rivers and lakes, when (from the loss of their quill feathers) they are unable to fly. When chased by a canoe, and obliged to dive frequently, they soon become fatigued, and make for the shore with the intention of hiding themselves; but as they are not fleet, they fall an easy prey to their pursuers. In the autumn they again assemble in flocks on the shores of Hudson's Bay for three weeks or a month previous to their departure southward."

The Canada goose feeds on aquatic vegetables and their roots, and delicate marine-plants of the genus *ulva*. To this diet they add grain and berries in their season.

The flight of this species is laborious and heavy, and generally in single file, or in the form of two sides of a triangle, the leader, some old gander, being the *apical* bird. From time to time this leader utters his deep "*honk*," which is responded to by the rest of the flock, and which may be translated, "What cheer, ho?" "All's well!" Very often, however, all is not well, for the line is scattered by the fire of the gunner; often, too, they meet with dense fogs, in which they become bewildered, and after wheeling about alight on the ground, where the gunners give them a warm reception. In some districts the sportsmen take with them into the marshes one or two of the domesticated race, which by their call attract the flocks passing overhead, and allure them to destruction.

Wilson says that, except in calm weather, the flocks of Canada geese rarely sleep on the water, generally preferring to roost all night in the marshes. When the shallow bays are frozen, they seek the mouths of inlets near the sea, occasionally visiting the air-holes in the ice; but these bays are seldom so completely frozen as to prevent them feeding on the bars at the entrance.

The Canada goose is a beautiful species, and its flesh is excellent. The head, two-thirds of the neck, the greater quills, the rump, and tail are perfectly black; the back and wings brown, edged with wood-brown; the base of the neck anteriorly, and the under plumage generally, brownish gray; a few white feathers are scattered about the eye, and a white cravat of a kidney shape forms a conspicuous mark on the throat; upper and under tail coverts pure white; bill and feet black. Such is a brief sketch of the Canada goose in a state of nature. Man, however, has appreciated its value, and it is kept domesticated not only in America, but in many parts of Europe where it breeds freely. In America the ordinary gray goose of Europe is very common; but this bird does not thrive there so well as in Europe; hence many prefer the Canada goose, which is as familiar, and its equal in other points.

This species will breed with the common goose; and it is asserted that the hybrid progeny is far superior in the flavor and sapidity of its flesh to the unmixed progeny of the common goose. Buffon, in whose time the Canada goose was kept in a domestic state in France, says: "Within these few years many hundreds have inhabited the great canal at Versailles, where they breed familiarly with the swans." That is, we suppose, interbreed with the swans, an instance of which has not come under our own notice; the intermediate position, however, of this species renders the fact probable.

Like the duck and the common goose, the Canada goose under domestication ceases to be as strictly monogamous as it is in its wild state —a circumstance which, in our tame *anatidæ*, may result from the plan of keeping but few males, and these in association with a flock of females, so that the ordinary results of pairing—that is, retiring from the rest to a secluded spot, which the mated pair exclusively occupy—are interfered with. Yet, as may be seen in the instance of the common goose, the male generally attaches himself to a particular female, while she is followed by her brood of goslings over the common, and is energetic in their defense. The instinct is not quite obliterated—there is a reigning sultana.

It is a question worth attention, whether the Canada goose might not with advantage be more extensively kept in our country than it is at present; it is common as an *ornament* to sheets of water in parks, gardens, and pleasure grounds, but is too much neglected as a bird of *utility;* it is alike valuable for flesh and feathers; it is not so decided a grazer as is the common goose; the precincts of marshes and ponds which abound in aquatic vegetation, for the procuring of which its strong bil and long swan-like neck afford it facility, offer the most advantageous sites for its establishment, and in such localities we strongly recommend its adoption. With regard to its management little is to be said; the sitting females require secluded nests, free from intrusion; and the flock, in addition to the vegetables they pick up, require an allowance of grain

Like most birds known both in a wild and domestic state, the latter exceed the former in weight and magnitude.

FEEDING POULTRY.—It is a bad practice to under feed poultry. From the very first they should have good and solid food. Steamed potatoes and other roots mixed with meal of the various grains, form a cheap and excellent food. It is not necessary to soak, grind, or boil the grains for fowls, however, where they can have free access to pebbles to supply their own grinding-mills, by which they turn their own grain into flour. But when pent up and unable to procure what they so much need, meal, and boiled and crushed food should then be given them. The poultry-house, however, should be constantly supplied with fine gravel, lime, and pulverized charcoal—articles indispensable to the health and improvement of fowls. Green food should be given them daily. Cabbages hung where the fowls can pick at them are a good article. In winter, chopped potatoes, turnips, etc., are the only convenient green food. When practicable, fresh animal food should be frequently given fowls that are shut up, or at seasons when they cannot procure insects or worms. A bullock's liver, thrown in the yard, is a cheap and good food for them. Indian corn is an excellent food, and may be freely given.

Cayenne pepper, indeed all descriptions of pepper, especially the cayenne in pods, will be found a favorite with fowl, and will be greedily devoured by them; it acts as a powerful stimulant, and remarkably promotes laying; and, when mixed in a ground state with boiled meal, will be found productive of the best effects. In this, however, as in every thing else, let moderation be your ruling principle.

A different system should be adopted in treating poultry for the table, and for the laying and breeding department.

With regard to feeding fowls for the table, much depends on circumstances. Spring chickens may be put up for feeding as soon as the hen ceases to regard them, and before they lose their first good condition. In their fattening-pens they will have no opportunity of picking up little pebbles; their mills, therefore, will be inoperative, and the diet must consequently be pultaceous, viz., bread and milk, barley-meal, or oatmeal and milk, and meal of steamed potatoes mixed with barley-meal. Some recommend the occasional addition of a few grains of cayenne pepper, or of dried nettle-seeds, which the foreign feeders are in the habit of giving. Where chickens have the run of a good farm-yard, and plenty of food, it is a work of supererogation to pen them for fattening; they will be ready at any time for the table, and their flesh, being in its healthy state, will be sweet and juicy, delicately tender, and sufficiently fat. Some, indeed, prefer fatted fowls; but this is a matter of taste; to many the greasy fat of poultry is very disgusting.

The practice of cramming poultry by the hand is quite common, though not to be recommended. In France they have machines by which one man can cram fifty birds in half an hour. It is somewhat on the principle of a forcing-pump. The throats of the birds are held open by the operator until they are gorged through a pipe, which conveys the food from a reservoir below placed on a stool. In fifteen days, fowls are said to attain the highest state of fatness and flavor by this feeding. In addition to the ordinary paste of barley-meal, or meal made into little balls with milk, the dried seeds and leaves of nettles have been recommended by the continental poulterers, some of whom give a little henbane-seed to induce sleep, while others put out the eyes of the prisoners as the most effectual way of keeping them in a state of darkness, which is considered essential to their becoming rapidly fat; and under the pretext of relieving them from the irritation of vermin, they pluck the feathers from their heads, bellies, and wings. While fowls are thus preparing for the knife, though their bodies are closely confined, their hinder parts are free for evacuation and cleanliness, and their heads are at liberty to take in fresh supplies of nutriment.

Poultry are the better for high feeding from the very shell, and on this account the heaviest corn is often far cheaper for them in the end than tailings, as regards the flesh, or the size and substantial goodness of the eggs. Young chickens may be put up for feeding as soon as the hen has ceased to regard them, and before they lose their first good condition. When chickens are wanted for domestic purposes, they are often left at liberty in the farm-yard, and if they have plenty of good food, they will be in the most healthful state for the table, and rich and juicy in flavor.

POULTRY-HOUSES AND YARDS.—Those who intend to rear fowls or any kind of poultry on a large scale, should have a distinct yard, perfectly sheltered, and with a warm aspect, well fenced, secure from thieves and vermin, and sufficiently inclined to be always dry, and supplied with sand or ashes for the cocks and hens to roll in, an operation necessary to disengage their feathers from vermin: running water should be especially provided; for the want of water, of which all poultry are fond, produces constipation of the bowels and inflammatory diseases; and for geese and ducks, bathing is an indispensable luxury. A contiguous field is also necessary, for free exercise, as well as for the supply of grubs and grass to the geese. The fowl-house should be dry, well-roofed, and fronting the east or south, and, if practicable, at the back of a stove or stables; warmth being conducive to health and laying, though extreme heat has the contrary effect. It should be furnished with two small lattice windows, that can be opened or shut at pleasure, at opposite ends, for ventilation, which is frequently necessary; and the perches should be so arranged, that one row of roosting fowls should not be directly above another.

M. Parmentier has shown* by what arrangement a house twenty feet long and twelve feet wide may be made to accommodate one hundred and fifty hens at roost. The plan is simply this: the first roosting-perch (rounded a little at the upper angles only, for gallinaceous fowls cannot keep a firm hold on perfectly cylindrical supporters) should be placed lengthways and rest on trestles in each end wall, six feet from the front wall, and at a convenient height, which must depend on the elevation of the house from the floor, which should be formed of some well consolidated material that can be easily swept. Another perch should be fixed ladder-ways (*en échelon*) above this, but ten inches nearer to the back wall, and so on, until there are four of these perches, like the steps

* "*Dictionnaire d'Agriculture.*"

of a ladder when properly inclined, but with a sufficient distance between the wall and the upper one to allow the poultry-maid to stand conveniently upon when she has occasion to examine the nests, which it is her duty to do every day at least once, and in the forenoon. The highest of these she can reach by standing on a stool or step-ladder. By this contrivance the hens, when desirous of reaching the nests, have no occasion to fly, but merely to pass from one stick to another. If the size and form of the house permit, a similar construction may be made on the opposite side, care being taken to leave an open space in the middle of the room, and a sufficiently wide passage for the attendant to pass along the walls. It is not at all required to have as many nests as hens, because they have not all occasion to occupy them at the same time; and besides, they are so far from having a repugnance to lay in a common receptacle, that the sight of an egg stimulates them to lay. It is however true, that the most secluded and darkest nests are those which the hens prefer.

The nests, if built into the wall, are in tiers from the bottom to the top, the lowest being about three feet from the ground, and a foot square. If the laying-chambers consist of wooden boxes, they are usually furnished with a ledge, which is very convenient for the hens when rising.

But the best receptacles for the eggs are those of basket-work, as they are cool in summer, and can easily be removed and washed. They ought to be fastened not directly to the wall, as is generally the case, but to boards fixed in it by hooks, well clinched, and with a little roof to cover the rows of baskets. They will thus be isolated, to the great satisfaction of the hen, which delights in the absence of all disturbing influences when laying. All the ranges of nests should be placed chequewise, in order that the inmates, when coming out, may not startle those immediately under: those designed for hatching should be near the ground (where instinct teaches the hen to choose her seat), and so arranged that the hens can easily enter them without disturbing the eggs.

Wheaten or rye straw is the most approved material for the bedding, being cooler than hay: the hens are sometimes so tortured by lice as to forsake their nests altogether, in an agony of restlessness. A Dorking housewife has assured us that she once lost an entire clutch, from having, as she believes, given a bed of hay-seeds to her sitting hen. The chicks were all glued to the shells, and thus destroyed, owing, as she thinks, to the high temperature occasioned by the fermenting seeds.

For all purposes two cocks in a good run are considered in the poultry counties contiguous to London as sufficient for twelve or fourteen hens, but in France they allow twenty mistresses to each cock, which no doubt is on account of the high temperature there. In a confined yard, five hens are sufficient for one cock in our cold country, and a double set will not answer in very limited space. When there are two or more cocks, care shonld be taken not to have them of equal age or size, for in this case they are always jealous and quarrelsome; if one is decidedly ascendant, the other will never presume to dispute with him. It will be judicious also to avoid the introduction or changing of cocks in the breeding season, for the hens require constant intercourse with them, and several days frequently elapse before they become familiarized with a stranger. The best way is to bring in the new cock in the summer, either as a chick, or late in the year in the moulting season, when he will not take too much notice of the hens. As a general rule it would be well to have one a yearling and the other a year older. In the third year, the cock, who then becomes lazy and excessively jealous, should be killed.

In selecting eggs for hatching, care should be taken that they are not at the utmost more than a month old, but their condition for hatching will greatly depend upon the temperature of the weather: vitality continues longest when the weather is cool.

It has been asserted that the future sex of the bird is indicated by the shape of the egg; the round producing the female, and the oblong the male. But this is contradicted, and, we believe, with sufficient reason, and it is impossible not only to foretell the sex, but even to ascertain whether the egg be fecundated. This however is certain, that if the air-bag (at the obtuse end), which has been mistaken for the germ, and the purpose of which is to oxygenate the blood of the chick, be perforated even in the least conceivable degree, the generating power is lost altogether. Those eggs only which have been fecundated by the male are possessed of the vital principle. The number of eggs for a hen should not exceed sixteen, as she cannot impart the necessary warmth to more. It is by no means uncommon with experienced breeders to place two hens on the same day on their respective eggs, and then on the twenty-first day when the broods are out, to give the maternal charge of both to one of the hens, removing the other to another set of eggs, which, if she be a steady setter, she will hatch as in the first instance. This, however, must be deemed a cruelty, though some hens would instinctively continue to sit until death. They would, however, become so attenuated by continued sitting, as to lose the power of communicating to the eggs the necessary degree of warmth. The practice of the Surry breeders is to feed the hen on oats while sitting, as less stimulating than barley, which they give to the laying hens on account of this very quality.

CAPONIZING.—The making of capons, that is, emasculating the males, is practiced a little in some of the English counties, and very much in France, where the females are also rendered incapable of breeding, and termed in their unsexed condition *poulardes*, in order to give them the tendency to fatten. An incision is made near the parts, and through this the finger is introduced to take hold of and bring away the genitals, but so carefully as not to injure the intestines: the wound is then stitched up and rubbed with oil or grease; and the comb (which appears to be an unnecessary and gratuitous pain and insult to the sufferer) is often cut off. The females are treated much in the same way, when they do not promise well for laying, or when they have ceased to be fertile; they are deprived of the ovarium. The subsequent treatment is similar to that in the former case. Care is taken to give them good food for three or four days, and during that time to keep them in a place of moderate temperature, to avoid the danger of gangrene, which, considering the time of the year—midsummer, when the operation is usually performed —is a very probable consequence. Pullets of the largest breed are selected for the purpose, as they yield the greatest weight to the poulterer; and if employed in hatching, cover the greatest number of eggs.

DISEASES OF FOWLS.—Fowls and poultry in general are subject to various diseases; as, *apoplexy, diarrhœa, rheumatism*, the *pip* or *thrush*, the *croup* (often termed *roup*), the *gapes, inflammation of the tail gland* (also called the *roup*, though the term is improperly applied), and other diseases which are not understood. Great difficulties attend the treatment of poultry diseases. Who attends to them? what complaint do they make? and when they die, how few persons acquainted with the symptoms before death make *post-mortem* examinations, and then refer those symptoms to the morbid appearances which his scalpel reveals? The following are the chief *active* disorders among them; *apoplexy*, evidenced by inflammation of the membranes of the brain, or by effusion of blood within or upon it; *peritoneal inflammation*, rapidly fatal; *inflammation of the lungs*, including the bronchial tubes; *tracheal inflammation* (or *gapes*) with parasitic worms in the windpipe; *inflammation of the mucous membrane of the intestines*, evidenced by previous dysentery; and *inflammation or intumescence of the rump gland*, symptomatic of a *febrile condition.* But what can be said as to the treatment of poultry under disease? Very little. To speak the truth, neither are their diseases well understood, nor is the treatment of them generally successful. A few observations on particular complaints may, however, be useful.

Apoplexy makes its attack in most instances without the slightest previous warning. Could it be known that a bird was in danger of an attack, means might perhaps be taken to insure safety. Aviary birds, in the finest health apparently, will drop dead from their perch from this cause. They are often over-fed; they have not to exercise themselves in the task of seeking for food; they have an allowance in unlimited measure, but have no according measure of muscular exertion; they "do not earn their bread before they eat it," as wild birds do. "*Experientia docet.*" The best advice to give, as to the means of *prevention*, is to feed birds a little in proportion to the exercise which they have the power to take.

The Pip, or Thrush, may be regarded as a token of derangement of the mucous membrane of the alimentary canal generally, and not as a local disease; it is *symptomatic.* Its cure will be effected by low diet; that is (in the case of fowls), by an allowance of fresh vegetable food, mixed with potatoes and a little oatmeal, granting at the same time a plentiful supply of pure water. Give of castor oil a teaspoonful, or thereabouts, according to age and strength. Do not scrape the tongue, nor use ough modes of cleaning it, but apply a little *borax*, dissolved in tincure of myrrh and water, by means of a camel-hair pencil, two or three times a day. The symptoms of *pip* consist in a thickening of the membrane lining the tongue and palate, which causes an obstruction of the free inspiration, and makes the poor sufferer gasp for breath; the plumage becomes ruffled, the bird mopes and pines, the appetite fails, and is at last utterly extinguished, the bird at length dying, worn out by fever and starvation.

Gapes (Inflammation of the Trachea) is a very fatal disease, to which all our domestic gallinaceous birds, as well as pheasants and partridges, are subject, and which often occasions great mortality. In the first instance it appears to arise from a croupy or catarrhal affection, which is indicated by running at the nostrils, watery eyes, alteration of voice, and loss of appetite and spirits. The bird dies. If the trachea be examined, it will be found replete with narrow worms, about half an inch in length, imbedded in slimy mucus. This singular worm is the *Syngamus trachealis*, or *Distoma lineare.* It consists of a long and a short body united together; the long body is the female, the short body the male; each, were it not that they are permanently united together, being an animal distinct and perfect in itself. Whether these parasitic worms are the cause or consequence of the disease, we pretend not to say, nor can we tell how they become introduced into the trachea; this, however, seems to be certain, that their removal is requisite to give the feathered patient a chance of recovery. This can be done by means of a feather, neatly trimmed, which is to be introduced into the windpipe, and turned round once or twice, and then drawn out. It will dislodge the worms, and bring back many of them adhering with slime unto it. This plan requires great dexterity, and some knowledge of the anatomy of the parts; a slow, unskillful operator may kill the already half-suffocated bird, instead of curing it. Another mode of destroying these worms is, by putting the birds in a box, and making them inhale the fumes of tobacco, thrown into it through the stalk of a tobacco-pipe. Some recommend the forcing of tobacco-smoke down the bird's throat, and others that the mouth be crammed with snuff; while many place faith in the efficacy of a pinch of salt, introduced into the back part of the mouth. Something like a scientific mode of treatment may, however, be suggested. Give a grain of *calomel*, made up with bread into a pill, or two or three grains of Plummer's pill (*pil. hydr. submur co.*, London Pharmacopœia); after which let flour of sulphur be administered, with a little ginger, in pultaceous food composed of barley-meal. In the mean time let the bird be kept in a dry warm shed or room, apart from the rest of the fowls, as the disease may be infectious. Let the mouth and beak be washed with a weak solution of chloride of lime. A correspondent, who dates his letter from Wootton, Christchurch, speaks of turpentine as the only remedy on which to depend. His words are: "Half a teaspoonful of spirits of turpentine, mixed with a handful of grain, is a certain cure in a few days, giving a handful of such grain to a couple of dozen young chicks each day. It is the most perfect and unfailing remedy. I communicated this receipt to the 'Gardeners' Chronicle' (No. xxix., July 17, 1847, p. 476), and I understand it has been found by other persons besides myself to be successful —perfectly so. In this part of England it is the only disease of chickens; and for two seasons the number that died of it was very great." The *rationale* of this mode of treatment is as follows:—the turpentine is absorbed into the system, and so brought into contact with the parasitic worms in the windpipe, to which it is speedily fatal; they are then ejected with the mucus; and the cause of irritation being thus removed, the bird speedily recovers. Wet, ill-feeding, an ill-ventilated fowl-house, confinement on a spot or plot of ground tenanted year after year by fowls, without attention to cleanliness, to renovation of the soil, and a proper allowance of gravel, ashes, fresh vegetables, etc.; these are the causes which produce this and many other diseases. The gapes is an epidemic disease, which often thins the preserves of pheasants and the coveys of partridges.

Inflammation of the Lungs, including the bronchial tubes, is not uncommon. Its symptoms are quick breathing, often with a rattle or râle very audible, dullness, disorder of plumage, vacancy in the eye, and indisposition to stir. In this, death can hardly be prevented. Human patients can explain their feelings—cattle, to a certain degree, indicate them, and speak in dumb eloquence; but birds give little indication, by voice or manner, leading to what the medical man calls *diagnosis*. The persevering use of cod-liver oil will give relief, and even effect a temporary, or at any rate an apparent cure; but who would like to breed from the bird.

Peritoneal Inflammation, or Peritonitis.—This disease runs so rapid a course, that death not unfrequently occurs before any marked symptoms have appeared indicative of active disease. The bird perhaps appears a little drooping—it refuses to eat; but as it is highly fed, this circumstance occasions no surprise; it retires to its roost, and is found dead in the morning. Examination at once reveals the cause of death—the peritoneal membrane exhibits all the indications of active inflammation. We have noticed the occurrence of the same disease among carnivorous mammalia. An animal appears to be as well as usual—at least it attracts no observation—but it dies suddenly. On opening the body, the cause is manifest—*Peritonitis* has done its work.

Inflammation of the Mucous Membrane of the Intestinal Canal is usually evinced by *dysentery*. The bird pines; it is purged; in a little time the evacuations become more or less tinged with blood, and death ensues. Damp and improper food are the causes of this affection. It can be treated with success only in the early stage. First give a small quantity of castor-oil. This will clear the bowels of irritating secretion. Afterward let the bird have doses of the *Hydrargyrum cum cretâ* (of the London Pharmacopœia), rhubarb, and laudanum:—of the hydrargyrum cum cretâ, three grains; rhubarb, two or three grains; laudanum, two, three, or four drops. Mix in a teaspoonful of gruel or gum-water. To be given every alternate day for a fortnight.

Simple Diarrhœa may be generally cured by a change of diet, and a little chalk given in gruel.

Constipation of the Bowels will yield to castor-oil, and a diet upon oatmeal porridge and green vegetables.

Asthma.—Both fowls and pigeons are affected with this complaint, which is evidenced by difficulty of breathing and a wheezing, rattling noise on inspiration. It is the result of a thickening of the bronchial tubes from previous inflammation, often accompanied by an alteration in the structure of the cellular tissue of a portion of the lungs. There appears to be no rational plan of treatment likely to effect a cure.

Inflammation and Intumescence of the Rump Gland is generally symptomatic of a febrile condition of the system. To this affection the term *roup* (an indefinite term for all the diseases of poultry) is often applied.

The treatment is simple. Let the swelling be opened by a lancet, and the matter gently squeezed out; afterward foment well with warm water; put the bird upon a diet of oatmeal and green vegetables, and, if necessary, give a teaspoonful of castor-oil. Be sure that the roosting-place is clean and well ventilated.

Moulting.—This process is natural, and consists in the gradual exchange of old feathers for new ones. Nevertheless it often happens that birds in a state of domestication have not sufficient vital energy for the accomplishment of the change. They require improved diet, warmth, and good water. Of course their roosting-place must be properly sheltered and ventilated. A grain or two of cayenne pepper, made into a pill with bread, may be given daily with advantage. Saffron is useless; but a nail, or any bit of iron may be put into the drinking-trough, in order to render the water chalybeate.

Fowls are subject to a loss of feathers, which must not be confounded with moulting. At first the plumage appears ruffled and disarranged; then the feathers begin to drop out, and continue to fall till the bird is greatly denuded. In the mean time it is dull and destitute of appetite, and becomes thin and feeble. This disease is most common among poultry kept in a limited space, debarred from exercise and fresh air, with a wet soil beneath them, having little or no gravel, nor any dusting-place in which to clean their plumage: it is analogous to the mange in cattle, and is not easily cured. A change of diet, good air, cleanliness, and a dusting-place (or, as some call it, a dust-bath), are essential. Some recommend small quantities of sulphur and nitre mixed with butter to be daily given.

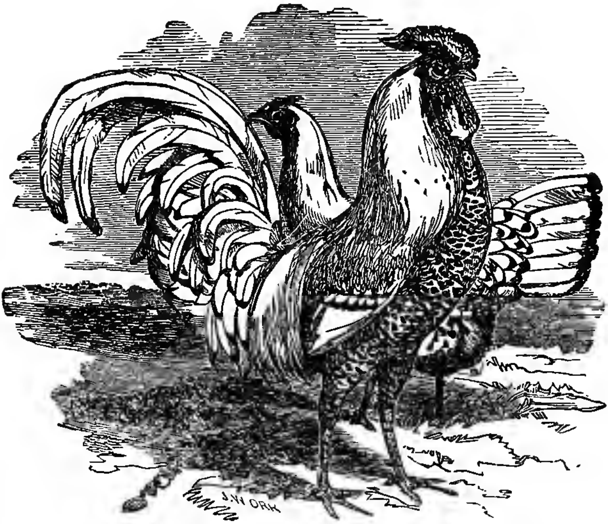
As the successful treatment of diseases may sometimes depend on promptitude, it may be useful for every poultry-keeper to have a convenient supply of a few simple medicines. The following may be named as rather suggestive than complete:—1. jalap, in fifteen-grain powders; 2. hydr. cum cretâ, in three and five-grain doses; 3. cod-liver oil; 4. cocoa-nut oil; 5. flour of brimstone; 6. Baily's roup pills.

In cases where inflammation is suspected, the hydr. cum cretâ is pronounced by the best judges to be a valuable medicine. To a grown fowl five grains, with from five to fifteen grains of jalap (according to the strength of the dose required), may be given. Jalap is a very good poultry medicine. Cocoa-nut oil and flour of brimstone make perhaps the best ointment for white comb, and one which is less disfiguring to the plumage than turmeric. Baily's roup pills are almost universally known and appreciated.

SHIPPING POULTRY AND EGGS.—Messrs. Charles R. Huntington & Co., produce commission merchants in New York, give the following directions as to slaughtering and shipping poultry and eggs:—

Food in the crop injures the appearance, is liable to sour, and purchasers object to this worse than useless weight: therefore keep from food twenty-four hours before killing. Opening the veins in the neck is the best mode of killing. If the head be taken off at first, the skin will recede from the neck-bone, presenting a repulsive appearance. Most of the poultry sent to this market is "scalded" "or wet-picked," but "dry-picked" is preferred by a few, and sells, to a limited extent only, at good prices. Poultry may be picked dry without difficulty, if done immediately after killing. For scalding poultry, the water should be as near the boiling point as possible, without actually boiling; the bird, held by the legs, should be immersed and lifted up and down in the water, three times—the motion helps the hot water to penetrate the plumage, and take proper effect upon the skin. Continue to hold the bird by the legs with one hand, while plucking the feathers with the other without a moment's delay after taking out—if skillfully handled in this way, the feathers and pin-feathers may all be removed without breaking the skin. A torn or broken skin greatly injures the appearance, and the price will be low in proportion. The intestines or the crop should not be "drawn." After removing the feathers, the head may be taken off and the skin drawn over the neck-bone and tied; it should next be "plumped" by being dipped into water, nearly or quite boiling hot, and then at once into cold water about the same length of time. Some think the hot plunge sufficient without the cold. It should be entirely cold but not frozen before being packed. If it reaches market without freezing it will sell all the better. In packing, when practicable, use clean hand-threshed rye-straw; if this cannot be had, wheat or oat straw will answer, but be sure that it is clean and free from dust of any kind. Place a layer of straw at the bottom, then alternate layers of poultry and straw, taking care to stow snugly, back upward, legs under the body, filling vacancies with straw, and filling the packages so that the cover will draw down very snugly upon the contents, so as to prevent shifting or shucking on the way. Boxes are the best packages, and should contain from one hundred and fifty to three hundred. Large boxes are inconvenient, and more apt to get injured. Number the packages, mark the contents, the gross weight, and the tare of each on the cover; mark plainly to our address, placing your own initials also on the package, and send invoice and railroad receipt by mail, to avoid errors or delay in reporting sales.

Eggs require special care in packing. First—secure strong and substantial barrels, either good second-hand barrels, or new split-stave oak ones. Commence by putting a small quantity of clean wheat or oat straw at the bottom of the barrel; cover this with dry, sound oats, as clean, bright, and as free from dust as you can get them, say about two inches of uniform depth. Then pack eggs on the side, leaving a space of three-quarters of an inch between the outside tier and the staves; fill up the layers by making regular tiers. Carefully avoid packing so close together as to crowd them. Use plenty of oats, and shake the barrel well after covering each layer with oats. Leave a space of about three inches at the top, and cover the top layer of eggs with about two inches' depth of oats. Cut, of brown paper, a circle sheet that will just fit the barrel, and lay it on the oats. Then put on this a sufficient quantity of wheat or oat straw, or dry hay, to require a strong pressure to get the head into the crozen. Examine eggs closely, and be particular in counting. Always mark the quantity of eggs in dozens, and the number of bushels of oats contained in each barrel upon the head, and also upon the side of each barrel, with the initials of your name or firm. Eggs packed in this manner will command ready sale in this city, at the current market price, without any deduction for broken or rotten eggs, at all times. In order to avoid claims for rotten eggs it is desirable to ship frequently.

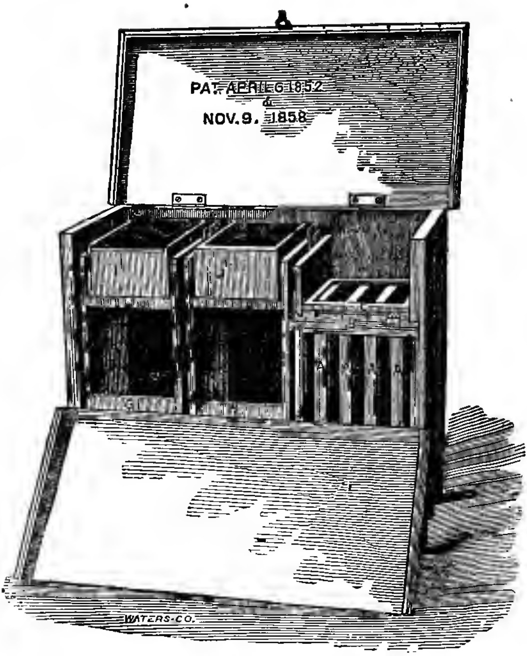


THE SILVER-SPANGLED HAMBURG FOWL.

BEES:

THEIR

HABITS AND MANAGEMENT.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BEES.

THEIR HABITS AND MANAGEMENT.

THREE CLASSES OF BEES.—The **Queen Bee** is the sovereign, and literally the prolific parent of all her snbjects. She is the sole monarch.

Her body is longer, larger, and more pointed than that of the others, and her wings are much shorter than theirs, hardly reaching beyond her middle, whereas those of the others cover the entire body; her belly and legs are of a deep golden color, and the latter are not furnished with the little brushes which those of the workers have, to help them in collecting the floury matter which they require for making honey.

Anecdote of two Queen Bees.—The qneen bears no rival authority. If there should be a second queen, she is either sent forth with an attendant swarm of colonists, or pnt to death by the other bees.

Huber gives an account of a duel between two queens, who, issuing from their nurseries in the same hive, rushed into deadly conflict, catching each other with the teeth. As if they dreaded the fatal consequences to themselves, which would follow from unsheathing their darts, they had the prudence to separate at the height of their fury and fly away. But the other bees compelled them to decide the point of sovereignty on the spot, and then forced them to the contest again. This was done repeatedly, after intervals of breathing-time, until the stronger of the two, seizing the other by the wing, stabbed her to death.

The qneen-bee commences depositing her eggs when about five days old; during the heat of the season she lays from one hundred and fifty to two hundred eggs per day, and lays with little or no intermission from early spring to the middle of autumn.

Drones.—The second class of bees are the drones. They are bulkier

in the body than either the queen or the working-bee. Their head is rounder, proboscis shorter, eyes fuller, an additional articulation to the antennæ, and *no sting*. They also make more noise in flying than the other bees. The drones are the *males* of the hive; by them the royal mother is impregnated and her eggs fertilized. How or when this interconrse takes place has long furnished philosophers with a subject for controversy and inquiry; and it has not even yet been set at rest in such a manner as to admit being proved to a positive demonstration.

The drones form about a tenth part of the population of a hive. They are certainly idle and lazy, as are the husbands of other queens; yet they fulfill the objects of their creation. They cannot collect honey, for they have not the necessary organs for the purpose; their teeth are too little and too short for breaking off the capsules, their mouths are not well formed for sucking the sweets of flowers; and their legs have not those brushes or powder-puffs which enable the other to bring home the farina wanted for making wax. During the summer they find food for themselves, and pass their time in lounging from flower to flower, and they are not found in the hive during the winter. By an extraordinary instinct, they are massacred without pity by the females before this period, in order to save the winter stock of honey, until they have departed voluntarily to some nook where they may rest until wanted in the next spring. These poor things have no weapons of defense.

Working Bee.—The third class is the working bee. The working bee is considerably less than either the queen bee or the drone. It is about half an inch in length, of a blackish brown color, covered with closely set hairs all over the body, which aid it in carrying the farina it gathers from the flowers; and on the *tibia*, or *forearm*, as it were, of the hind leg, is a cavity of cup-like form, for the reception of the kneaded little ball of pollen. It is the working bee which collects honey and pollen, and which forms the cells, cleans out the hive, protects the queen, looks after the condition of the young brood, destroys or expels the drones, when these are no longer necessary to the well-being of the community; who, in short, performs all the offices connected with the hive and its contents, save only those which have reference to the reproduction of the species. The working bees are of no sex, and are furnished with a horny and hollow sting, through which poison is ejected into the wound it makes; this poison is of an acrid character, and of great power in its effects, proving fatal to any insect, and instances are on record of its proving so to horses and cattle, nay, even to human beings: when human beings, however, are stung (an accident that will happen very seldom, if they use the precautions in manipulating with their bees, that shall be detailed in the course of this volume), they can instantaneously obtain relief by pressing upon the point stung with the tube of a key; this will extract the sting and relieve the pain, and the application of common spirits of hartshorn will instantaneously remove it; the poison being of an acid nature, and being thus at once neutralized by the application of this penetrating and volatile alkali.

WONDERFUL INSTINCTS AND CONTRIVANCES OF BEES.—The contrivances of bees in the construction of their combs are amongst the most wonderful works of God, as regards insect creation. "The form of the comb is in every country the same, the proportions accurately alike, the size the same, to the fraction of a line—go where you will, and the form is proved to be that which the most refined analysis has enabled mathematicians to discover, as of all others the best adapted for the purpose of saving room, work, and materials. This discovery was only made about a century ago; nay, the instrument that enabled us to find it out was unknown for half a century before that application of its powers. And yet the bee has been for thousands of years, in all countries, unerringly working according to a fixed rule, which no one had discovered until the eighteenth century."

We may instance among other surprising illustrations of the ingenuity of these wonderful creatures, that they lay the foundations of their cities at the top of the hive, and build downward. They have straight passages, or lanes, across their different dwelling-places, wide enough for two bees to pass.

ADVANTAGES OF KEEPING BEES.—It is strange, that though the expense of establishing stocks of bees, where there is a garden, is so trivial, and the possible gain so great, few people take the trouble of keeping them. Country cottagers too generally neglect to take advantage even of an adjoining common or lonely garden, which specially invite to bee-keeping. Where cottage gardens are very small and crowded, and multitudes of children swarm, it is certainly difficult, if not dangerous, to introduce tens of thousands of bees, with their formidable stings; but in numberless instances where bee-husbandry is neglected, it might be pursued with some profit.

No farmer, nor even humble cottager, who has a patch of garden, and lives near commons, heath-covered hills, or woods, should be without hives, as the great supply of bees' food is obtained by their own exertions. It is not the rarest and most beautiful flowers which afford the best honey, but those which abound in the open fields as well as in the garden; the flowers of mountain heath, clover, trefoil, beans, vetches, wild thyme, turnips and cabbages, privet, elder, bramble, rue, and, above all, the blossoms of the common furze, are among the best materials for honey. The cost of food is scarcely any thing, and the return may be considered clear gain.

The trouble of rearing bees, compared with the pleasure or the profit, is nothing.

MANAGEMENT OF BEES.—To him who is about engaging in bee-keeping, the first question of interest is, how to select his stock. As a rule, the spring is the best season to purchase a stock of bees, as they have then passed the casualties of the winter; and the question of profit, so far as the first year is concerned, is quite clear, if the swarms are judiciously chosen. Their value depends upon the health and number of bees, and the time they have occupied the hive. The number in a colony can be judged of with comparative accuracy by raising the hives and examining them, or by the hum produced on giving them slight taps; and by the weight, as shown either by lifting or weighing. The age of a swarm is told by the color of the comb; in new swarms the color being white, and varying from that to nearly black, in very old swarms. The brood combs grow thicker with age, and the cells and the bees hatched in them are therefore smaller, and the latter feebler. It is poor economy to purchase a colony more than two years old.

Transporting Bees.—Let the hive be placed on a cloth, the ends of which must be carefully tied over the top; if it is to be taken to a distance, the hive so tied up may be swung on a pole fastened across a cart from side to side; this prevents the jolting to which it might otherwise be subject, which would disturb the bees, and probably shake down the comb. When arrived at its destination, let the hive be placed on the stand, and if any of the bees have fallen out on the cloth, place them near the entrance, and they will soon find their way in.

SPRING MANAGEMENT.—As soon as the weather is fine examine your hives by lifting them carefully from the stand. Clear away all the dead bees and refuse matters which have collected during the winter. Rub the mouldiness and damp from the floor-board, and let it be well dried. The bottoms of the combs often become mouldy in the winter, especially in light stocks, and it will be a good thing to cut off the lower portions, which may be done with a table-knife, and without danger, by turning the hive on one side, in the evening or early in the morning, or at any time, if you take the precaution of wearing a bee-dress, hereafter described. The bees will soon renew the combs, and their health will be improved by the removal of the decayed portions.

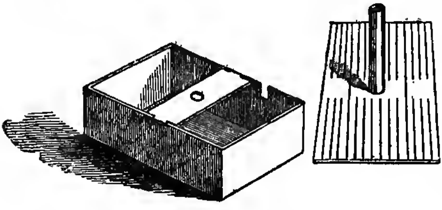
Feeding.—Many swarms die in spring for want of food, and the wise apiarian will therefore feed his bees liberally, bearing in mind that what he gives them is not lost, as they can fully store for their owners' use what is not needed for their own support.

Begin to feed the light stocks; a liberal supply of food will be amply repaid by the consequent health and vigor of your bees, and the abundant store they will collect for your future benefit. And do not prematurely encourage the bees to go in search of food, but rather confine them to their homes. Guard against the admission of stranger bees while yours are feeding. Give honey now, if you can, rather than syrup, as it forms a better ingredient than sugar in the jelly which supports the young brood.

The consumption of food in a hive is now perhaps greater than at any period of the year. The queen lays from one hundred to two hundred eggs daily, and the increase of the brood is so prodigious, that it is impossible for any except a well-stored hive to meet the demand for food. Many persons wonder that their bees die in the spring, when they have survived the winter; but the food consumed during the cold weather is comparatively very small to what it is during breeding time. On this ground, then, feed abundantly all the stocks, but especially the light ones.

Feeding outside the hive, by placing food at the entrance, is a bad method, as stranger bees are attracted, which deprive your bees of a proportion of that which you have provided for them. Feeding at the bottom disturbs the bees, lowers the temperature of the hive when the food is introduced, and thus occasions loss of life; therefore, to obviate these evils, ingenious feeding-pans have been invented for supplying food at the top of the hive.

The following directions for feeding bees are from "The Bee-Keepers' Chart:" "Before feeding is commenced the hives should be set down upon the floors and the entrances for the bees so closed as to admit only one or two at a time. Two or three inch auger holes may be bored in the top, and the feeder placed by the side of them and covered with a small box, and this covered with an old carpet to prevent other bees from scenting the feed." Phelps's *Bee-Feeder* is thus figured



PHELPS'S BEE-FEEDER.

and described, and it may lead the ingenious to adopt it on a better plan:

"It consists of a tin pan, or tray, placed in a wooden box, with a float to fit, and a tin tube passes through the float and is secured to it on the under side. The float may be raised at any time, even if it is covered with bees, by means of the tube, and the syrup poured into the pan through the tube by inserting a funnel in the top of it. The float supports the bees and prevents them from getting into the syrup, and as they consume the syrup it settles down with them. A piece of wood across the top of the box, with a hole for the tube, keeps it in its place, and a pane of glass on each side of this confines the bees, and affords an opportunity to observe their operations while feeding."

The same author recommends the following compositions for feeding bees:

First: two pounds West India or Orleans sugar; three gills ale; one gill Malaga wine; (if the ale and wine cannot be had, use sap or water,) one teaspoonful fine salt. Mix together in a tin or copper vessel; set it over a slow fire; stir occasionally until it arrives to a boiling point; set it off, and let it cool, remove the scum, and it is fit for use.

Second: one gallon (or twelve pounds) of West India or any other honey; four pounds West India or Orleans sugar; one gallon maple sap or water; half a pint ale; two tablespoonfuls fine salt. Heat and mix as above. This composition may be made without the ale by using water.

It is however doubted by some experienced bee-keepers, whether the general feeding of bees is, upon the whole profitable. It is argued that while it is wise to feed bees that have not sufficient food to keep them alive, any thing given them beyond that is unprofitable, and produces an inferior article of honey, if any thing but pure honey be fed. The following is Mr. Eddy's argument:

"The theory of feeding bees on a large scale has had its day. It has presented splendid results for a time, and resulted at length in splendid failures. Cheap honey, or a composition, has been used, and the bees have been fed freely, under the impression that whatever they stored in their cells must of course be honey of the first quality. I would ask why Cuba or Southern honey is not made of the first quality when it is stored up for the first time in Cuba or Florida, if bees have the power of converting an inferior article into one of superior quality. The true reason is, that much of this so-called honey is taken from the sugar plantations, or from flowers which do not furnish the best honey. And the second transportation, although done by "Yankee" bees, does not produce any chemical change in the article which is fed. Honey is gathered, not made by the bees. Those who purchase in market Cuba honey which is packed up in "Yankee" boxes, do not get the best end of the bargain. They have yet to learn that the packing or transportation does not make it the fine-flavored and wholesome article which is found in white clover upon all our hills in New England. The feeding of the bees on a large scale, or with a view to secure larger quantities of surplus honey, operates unfavorably upon the bees in a variety of ways, and the principal objections to it are the following; 1. There is no profit in it. No man gets the quantity of honey which he feeds 2. It prevents the bees from going abroad to gather honey from the fields. 3. If the bees are fed liberally late in the fall and early in the spring, there will be very few empty cells in which to rear young bees. 4. It is deceptive, because a cheap and inferior article is sold for one of superior quality. 5. It results, in the process of time, in the extinction of the bees. The feeding of the bees may be practiced with advantage whenever they are not amply supplied with winter stores, a thing which happens to late swarms and to those from which large quantities of honey have been taken. For this purpose a cheap article may be used to help them through the winter. It may be desirable to take from the bees all the white clover honey which can be obtained in boxes with a view to supply the bees with a cheaper article."

Daily Examination of the hives for the removal of all filth tends to domesticate the bees, and if done gently the effect is to so accustom them to their keeper that he can handle them with perfect impunity.

The Position of the Bee-House should be free from exposure to the north and west winds, and from the morning sun. A southwest exposure is recommended by the best authorities.

SUMMER MANAGEMENT.—Preparations for Swarms.—Every thing necessary should now be prepared for the establishment of swarms, which may be expected during the next two months, else there may be running hither and thither, while the swarm takes wing and is lost through your delayed preparation. Hives, or boxes if you intend to make use of these, must be kept dry and sweet; stands or stools to place them on must be prepared, and a hand-brush, leather gloves, crape, or other covering for the face, placed in readiness.

As bees require water to drink, especially through this and the next month, it is necessary to place some for them, if there is no pond or rivulet near. Cotton says that, in the Isle of Wight, the people have a notion that every bee goes down to the sea to drink once a day. Water is needful for them in the breeding season, and they will drink water with salt in it, and like it better than the freshest brook that runs. It is very curious to see how they will flock by thousands to the drinking-troughs in April, May, and part of June; and then their thirst seems to be quenched all of a sudden, for not one will be seen at them. The reason seems to be that they do not want so much water after the greater part of the young brood is hatched.

Shallow dishes or plates filled with water, and having thin boards, pierced with small holes, floating on it, from which the bees may drink without fear of drowning, are convenient. Small pebbles or moss, placed in the plates with the water, will answer almost as well.

The hives, if old, should be scalded to destroy the larvæ of insects. If new, the only preparation is to wet the inside with salt and water, sweetened with either honey, molasses, or sugar.

Indications of Swarming.—The most certain indications of swarming are, the hive appearing full of bees—clusters of them gathering on the outside, and sometimes hanging from the alighting-board; they also neglect their daily toil and refrain from going abroad in search of sweets, even though the weather be ever so inviting. Just before they take flight, the hive is hushed, the bees are silent and carefully loading themselves with provender for their journey. For two or three nights prior to swarming, you will also hear a peculiar humming noise within the hive; the second swarm is announced by a different sort of buzzing, being, according to some writers, the result of a contest as to which of the two queens shall lead off from the hive. It is the old queen who leads off the first swarm.

If a swarm be about to quit the hive, the slightest change of weather will prevent their doing so, but nothing so effectually as a shower of rain; hence an excellent mode of preventing it, when the bees cluster on the outside of the hive, by syringing them with water from a common metallic syringe. When a swarm leaves the hive, if it do not settle on some tree or bush, but remains in the air, and you fear its going off to too great a distance, if not evading you altogether, you may bring it down by throwing up sand or dust, which the bees mistake for rain, or by firing a gun, which they mistake for thunder; hence the old fashion of the country people following a swarm with the noise of fire-shovels and frying-pans. You must be the more diligent in at once securing your swarm, for it is a fact that the bees send out scouts previous to swarming, whose duty it is to select a proper habitation for the colony. It is, on this account, a good plan, when you anticipate a swarm, to leave an empty hive, previously smeared on the interior with honey, in some convenient place, but not too near the old one.

When the swarm settles, the bees collect themselves in a heap round the queen, hanging to each other by means of their feet. When thus suspended from a tree, they may be secured by simply holding an empty hive under them, and tapping the branch from which they are suspended. They should, in this case, be sprinkled with honey and water, and confined for about twelve hours. When a swarm divides into two or more bands, and settle separately, it is probable that there are two queens. In this case you must secure one of them.

If, through your inattention, a second swarm comes off, you should, as soon as you have hived it, secure its queen, and return the swarm to the hive; indeed, when deprived of its queen, it will usually immediately return of its own accord. Swarming is a subject, we have reason to believe, which is very generally misunderstood, most persons desiring to promote it, conceiving that the greater the number of swarms the richer will the hives be in August. The very reverse of this is the case; for, when a hive is weak in numbers, a sufficient number of bees cannot be spared to go forth for honey; and hence they will be scarcely able to collect enough for their actual support, far less to collect any surplus for their master's benefit. Hear Mr. Briggs:

"The swarming of bees is a subject on which much misconception prevails. Most persons who keep their bees in the old straw-hive plan, and suffocating system, appear to anticipate their swarming with much anxiety, and to be of opinion that the greater number of swarms—firsts, seconds, thirds, etc.—they obtain from their old hives during the summer, the more remunerative will they prove to the owner at the end of the season; whereas the reverse of the above practice is much nearer of being the best system to follow, which I shall endeavor to elucidate. It has been proved from observation, that the average percentage of swarms have been twenty-four in May, sixty in June, fourteen in July, and two in August; from which it will appear that June is the principal month for swarming, in ordinary seasons; and it is in June and July that the greatest quantities of honey are stored up by the bees, when managed in a judicious manner.

"When the swarming is assisted and encouraged during June and July, the old stocks are considerably weakened, and the swarms are employed in building combs in their new hives, collecting pollen, and attending to the young brood, until the best part of the honey-storing season is over; so that, at the honey harvest in autumn, it will frequently require the contents of five or six old stocks, or late swarms, to produce as much pure honey as might have been obtained from one colony on the system of management which is recommended."

In collateral boxes, and in capped hives, swarming may be prevented by affording the bees additional accommodation, and reducing the temperature; and, for this end, it is recommended, by most apiarians, that the hive or box should be furnished with a thermometer as well as ventilator. We think, however, that even those who do not possess these accommodations may manage well enough by proper observation and attention to the symptoms we have detailed. When these appear in a collateral box-hive, open one of the partitions, and admit the bees into a new apartment; if all be full, take off a box, empty and restore it. In the case of a capped hive, remove the bung, and admit the bees to the cap; if full, remove, empty, and restore it. On this subject Mr. Briggs says:

"The most favorable degrees of heat for the prosperity of the brood are from 75° to 90° in the stock hive, and from 65° to 75° in the side boxes. The heat in a prosperous hive is sometimes upward of 70° at Christmas, and will, in hot summer weather, sometimes rise to near 120°, at which time the combs are in great danger of being damaged, and of falling to the floor of the hive; this may, however, be prevented, by giving extra room when required, and by shading the hives from extreme heat, as previously directed. It should always be borne in mind that all operations with bees should be performed as carefully and as speedily as circumstances will permit. The late Mr. T. Nutt remarked, in a conversation with him a few months previous to his decease, 'that in removing boxes, glasses, slides, etc., the apiarian should proceed in a manner so steady and cautious, that the bees should scarcely know that their habitation had been meddled with;' in which remarks I fully concur."

After having a new swarm, you must also recollect, that if unfavorable weather follow their departure, you must feed them, otherwise they will be starved; indeed, it would be well if each new swarm were always fed for a few days, as this will assist them in gaining strength in numbers and in store, before the principal part of the honey season goes over. In conclusion we would merely say, that the weight of a good swarm should be from five to seven pounds, and that all under five pounds in weight should be united to others, as being too weak in numbers to support themselves.

Bee Dress.—In hiving a swarm it is as well to be protected with a proper bee dress. *Prevention is better than cure*, and it is *better to be sure than sorry;* yet bees are certainly less apt to sting at this time than any other.

Some persons are particularly unhappy in possessing those qualities which render them disagreeable to bees. The main objections are, excessive timidity, and likewise, with some, an unpleasant odor, in some instances the result of personal negligence, but frequently of peculiarity of constitution. The remedies are a *bee-dress* for the former, and the use of some strong perfume which the bees like, and which will effectually conceal whatever is offensive to them.

"I have gone among them," says Mr. Worlidge, "in their greatest anger and madness, only with a handful of sweet herbs in my hand, fanning about my face, as it were to obscure and defend it. Also, if a bee do by accident buzz about you, being unprovided, thrust your face amongst a parcel of boughs or herbs, and he will desert you. But the most secure way of all, and beyond the completest harness yet published, is to have a net knit with so small meshes that a bee cannot pass through, and of fine thread or silk, large enough to go over your hat, and to lie down to the collar of your dress, through which you may perfectly see what you do without danger, having also on a pair of woolen gloves."

Mr. E. W. Phelps describes the following form of a bee-dress, which may be procured at an expense not exceeding twenty-five cents: "Take one and a half yards of thin, light, three-quarter muslin, and a piece of wire-cloth (such as is used for meal sieves) about six inches square; it may be obtained of wire-weavers in most of our large towns and cities, or of hardware dealers. Lay the muslin over the head, with the ends down over the shoulders, with one end of the selvedge in front and the other back. The back part may be cut and fitted to the head, and a cord run in to gather it around the neck, and the wire-cloth sewed in over the face, first rounding the corners in shape of the face. It should extend down below the mouth, to afford free respiration, and the muslin sewed together below the wire-cloth, sufficient to extend below the vest. It may be worn under a coat, but it is not the best way, as it is usually warm weather when it is worn, and with the head-dress and a coat over it, a person will be very uncomfortable on account of the heat; besides, the bees will crawl up under one's coat and vest, and when in close quarters will often prick through the shirt, and tickle a person under the ribs. To prevent this and the other difficulty, I have prepared myself with a garment made of the same kind of material as the head-dress, and in the form of a hunting-shirt, open before, with buttons close together, to button up tight. I first put on my head-dress, and then over this my hunting-shirt, buttoned under my pants; and with a pair of thick woolen gloves, with stocking legs sewed to the wrists, to draw up over my sleeves, and my pants tied over my boots, I can defy all the forces they choose to bring against me.

Clustering Shrubs and Bushes, placed in the vicinity of the apiary, are recommended by experienced bee-keepers, as tending to diminish the difficulties of hiving bees. Mr. Phelps directs to "take the *seed-ends of* mullen-stalks about a dozen in number, and tie these to the tops of poles; the poles should be set in the ground so as to be easily taken up after the bees have settled on them; by managing in this manner, the hive may be set in the apiary, before hiving, and the bees may be carried on the pole and laid by the side of the hive, when they will enter it; this saves the trouble of moving the hive after hiving, and consequently no bees will be lost. The mullen tops should be attached to the poles so as to lie nearly horizontally. What there is in the mullen-stalks so attracting to the bees I know not, unless it is their rough, uneven surface, which affords the bees security against falling; old dry weather-beaten stalks are as good as any."

Mr. Weeks directs that "when there are no fruit-trees nor shrubbery in the immediate vicinity of the bees, it is found that they will cluster on bushes artificially set down about the hives; say, take hemlock, cedar, or sugar-maple bushes, six, eight, or ten feet high; sharpen the largest end, with the foliage remaining on the top, and set them down like bean-poles promiscuously round about the hives, two, three, or four rods distant; when the bees swarm, they will usually cluster in a body on some one of them, which may be pulled up, and the bees shaken off for the hive. Some apiarians confine a bunch of the seed-ends of dry mullen-stalks near the top of the bush, so as to represent, at a little distance, a cluster of bees: this is said to be unfailing in catching swarms. Others recommend to drive down two stakes, two or three feet apart, and confine a stick of sufficient strength to each stake two or three feet from the ground, forming a cross-bar, so that, when a board twelve feet long is laid, one end resting on the cross-bar and the other on the ground, the bees will cluster under it, admitting it is at a reasonable distance, and yet so far from the old stock as to be out of hearing of their hum. Any one will know how to turn the board over, and set an empty hive over the bees.

"The hiver is made of three rough boards, half an inch thick, seven inches wide, twenty-four inches long, nailed together like a common trough, open at both ends,—a strap of iron riveted on its outside, across the center of each board, with a shank or socket to insert a rod to handle it with, so that when inverted by means of the rod, and placed over the bees when alighting, it forms a kind of half hive, which they readily enter. There should be from a dozen to twenty half-inch holes bored through the top board, so as to let the alighting bees enter through the holes. When a small proportion of the bees are found in the hiver, it may be moved a few feet from the limb, which may be shaken with another rod with a hook on its end, which disengages the bees, and in a few moments the whole swarm will be found in the hiver. By the addition of ferules and joints, the hiver may be raised to any reasonable height. Thus the labor of climbing, the use of ladders, and cutting the limbs of precious fruit-trees, is entirely dispensed with. It likewise enables the apiarian, in large establishments, to divide out and keep separate his swarms, which might otherwise alight many in one body."

Management of Black Combs.—The combs in hives that have stood for several years become black and useless, because the bees never clear out the cells in which the brood has been reared, and the skins which the young bees cast gradually fill up the cells until they are too small for breeding in; in consequence the hives get weaker and weaker; swarming cannot take place, and at last the bees die.

To prevent this fatal end, you may in spring, before breeding-time commences, after fumigating the bees a little, turn up the hive and cut out half the comb; put the bees in again, and during the summer they will fill up the vacancy, and have room for breeding. Next spring take out the remainder of the old comb in the same way. One stock treated in this manner is said to have been kept for the long period of sixty years. Sometimes, when a stock has not swarmed, it is desirable to remove the bees altogether from the old hive into a new one. This must only be done during the first week in July; if attempted earlier, the new brood not being all hatched, many bee-grubs would be destroyed, and you would have a weak stock. On the other hand, if transferred later, there would not be time for them to make their comb and lay up winter store. Fumigate or intoxicate the bees at night, and put them while stupefied into a new hive, taking care that the queen is among them; place the hive on the stand in the same position the old one occupied, and on the morrow they will commence their labor as a new swarm. If the weather be fine, they will do well; but if they are found to be weak in autumn, take them up and unite them with another stock.

September is the proper time for carefully inspecting your stocks, to ascertain which will stand the winter, for feeding those which have not sufficient food, and for uniting weak stocks to strong ones, as previously recommended.

By gently striking the hives, you may judge whether they contain many or few bees, from the greater or lesser noise they make in the buzzing which immediately follows. Do not leave any to remain for the winter but such as weigh about twenty pounds.* But recollect that a hive with two thousand bees will be more likely to survive than one with only one thousand, even if the latter have much more honey. On this account it is important to ascertain the number of bees, and to make your standing stocks as strong as possible, to maintain sufficient heat in the hives.

FALL FEEDING.—Whatever food is required must be given now, as bees should not on any account be fed in winter. Those who have not the convenience of the feeding-pans for the top of the hive, should provide little hollow troughs made of elder, or a split bamboo stopped at the ends. These must be filled with honey or syrup, and then pushed into the mouth of the hive at sunset, the entrance being carefully closed, to prevent other bees from entering. Feeding should not take place in the daytime, as the hive will then be subject to the depredations of wasps and robber-bees which are attracted by the scent, and not unfrequently devour the whole of the honey. In the morning, a little before sunrise, remove the troughs. Continue this operation nightly until you are sure

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* *Age* will cause hives to weigh heavier than their *legitimate* contents would call for; this is occasioned by an accumulation of *bee-bread* and the cast sloughs which had formerly served as envelopes to the young. In the case of old hives, you must, therefore, allow from two to five pounds, according to age, for these matters.

your bees have sufficient winter provision. Do not be stingy: as we have said before, you will reap the profit of liberality to your bees in the rich return they will make.

HOUSING, etc., IN WINTER.—When there is snow upon the ground, the entrances of your hives should be entirely closed, and a screen or shade should be placed before the hive, in case of an accidental sunny day occurring, in order to prevent the bees from encountering even a single deceptive ray.

Another danger from which you are imperatively called upon to protect your bees during winter is *dampness*. It is to this cause that the loss of many a stock is to be attributed—an *internal dampness*, generated within the hive itself. This is best remedied by careful ventilation, placing a bell-glass, well covered with flannel, over the aperture on the top of your hive or box, removing it from time to time, and carefully wiping away from its interior the damp formed by condensed vapor; this remedy is at once simple and efficacious.

It will, perhaps, appear to some of our readers a singular experiment, resorted to by some bee-keepers, viz., *burying the hives.* When this is to be attempted, the hive should be buried in a cool, dry, shady place, among leaves, about a foot deep, and the interment should be performed during the first or second week of November.

A friend buried a hive of bees in the first week of November, about a foot deep, amongst dry leaves, etc., and disinterred it in the last week of February, when it was just *two pounds lighter than it was in November*, and the bees in *a lively and healthy state.* Another person immured a hive of bees in the earth four feet deep, in the second week of November, and at the end of January it was removed, and weighed *only three ounces less than it did before it was buried.*

The above experiments are worthy of attention; a shed having a northern aspect, and which is as dry as possible, would be a suitable place for further trials. The principal points by which there might be cause for fear of failure, would, as in other cases, be from dampness, disease for want of fresh air, and attacks from vermin, etc. To prevent the former I would recommend that the hives be placed on a long frame of wood, covered by a web of closely worked wire, and raised a few inches from the ground, the ends of which should communicate with and be occasionally opened to the fresh air. A long tube should also be placed from the hole at the top of each hive to the open air of the shed, from the upper end of which any dampness might be condensed by bell-glasses, and conveyed away as already directed.

Among other obvious mistakes, I may mention the recommendation to give the bees an opportunity of leaving the hive, and going abroad every fine day, already detailed. What advantage is expected to be derived from thus permitting the insects to go forth? They may be supposed to want exercise. This is a mistake; for the bees naturally crowd together, and remain in a sort of torpor during winter, and every thing that could tend to interfere with, or arouse them from it, must, of course, prove contrary to their natural instincts, and consequently, prejudicial. During winter the bees are inactive.

HIVES AND BOXES.—By having proper hives and boxes for bees, the following advantages are obtained:—First—the power of depriving bees of honey at pleasure, without injuring them. Secondly—obtaining it in larger quantities, and of finer quality. Thirdly—The means of a more thorough ventilation, the keeping of the bees cool, and of enlarging their accommodations at pleasure, and the power to control swarming at will.

ENEMIES OF BEES.—These are far more numerous than their diseases, and are as follows:

Poultry, mice, toads, frogs, snails, slugs, caterpillars, moths, millipedes, wood-lice, ants, lice, spiders, wasps, hornets.

Fowls should not be permitted in any apiary. They will kill and eat the bees, and such as they do not destroy they will annoy and disturb—besides, your bees will probably occupy a stand in your garden, a quarter whence other reasons should necessarily exclude poultry.

Mice.—While the bees are vigorous, the field-mouse does not dare attack the hive; but as the cold approaches, and the bees become less active, he enters, and commencing with the lower comb, ascends by degrees as the bees become torpid, until he either clears all away, or by the smell of the honey he has wasted on the board, induces other bees to come and plunder. As soon as the warm weather returns, the surviving bees will leave the hive in disgust. The remedy is easy. By having your straw hives, if you use such, coated on the exterior with Roman cement, you will prevent mice from nestling in the straw, whence otherwise they would speedily eat their way into the interior, and by narrowing the entrance of the hive in the manner already described, you will effectually keep out these little intruders. If your stands be placed on a single foot, or if the feet are so placed under the foot-board as to leave a wide, projecting ledge, no mice can arrive at the hive.

Toads will kill bees occasionally, but not in sufficient numbers to excite our alarm; but the toad is rather to be regarded as a friend to the bees—one of their enemies, the spider, being his favorite food.

Frogs may be classed with toads.

Snails and Slugs.—These creatures are not absolutely enemies of bees, as they have no design upon them or their honey in entering the hive, but merely do so from accident. The mischief done by them consists in the alarm and confusion they occasion. The bees first attack the unfortunate intruder and kill him with their stings, after which they carefully incase him in propolis, effectually preventing putrefaction or the production of maggots.

Caterpillars.—The most dreaded is the caterpillar of the wax-moth, so called from the ravages it makes amongst the combs as soon as it obtains entrance. By having the legs of the stand placed as we have already described, no caterpillar can climb up to the hive; but this will not prevent the moth herself from entering and depositing eggs in the hive; and so prolific are these moths, that a single brood would suffice to destroy a whole stock. Periodical fumigation, and cutting away such combs as contain the grubs, are the remedies to be adopted. Moths are only *nocturnal* enemies. During the day you have nothing to fear from their attacks. Let the entrance to the hive, therefore, be nearly closed in the evening, and you will protect your bees from their ravages. Columella recommends, as a trap for moths, a bottle, or other vessel, with a long and narrow neck increasing gradually to a wide mouth, and having a light in the neck, to be placed under the hive in the evening. We can vouch for the efficacy of this trap—it will destroy numbers. Another particular to be attended to is to have your stocks sufficiently strong; and for this purpose, if the hive attacked be weak, unite it to the bees of another hive, in the manner already described. The bees are themselves, if sufficiently strong in numbers, both willing and able to destroy the intruders. If weak, they will necessarily fall victims.

Millipedes, or Wood-lice, are often produced by the stands being made of decayed wood, or the hive being placed too near an old hedge. Let the stand be of new wood, and strew soot on the ground under and about the hive. This will also serve in part as a protection against the attacks of ants.

Ants.—You should always destroy such ants' nests as you find in the neighborhood of a hive. In the West Indies, glass-feet are used to prevent these insects from getting into furniture, etc. Might not such be used with advantage for bee-hives?

Lice.—These are small parasitical insects of a red color, which adhere to the body of the bee, and derive their nourishment from their juices. They are about the size of a grain of mustard-seed, or rather smaller.

Reaumur and others tried many remedies for these troublesome insects, but in vain, till at length Madame Vicat discovered that Morocco tobacco will kill the lice without injuring the bees.

Spiders.—Brush away their webs wherever you meet with them near your stand.

Wasps and Hornets.—These insects are most noxious to bees. Dig up and destroy their nests wherever you meet with them; but you will most effectually get rid of them by offering a reward for every queen wasp brought to you in spring. The destruction of each queen is tantamount to that of an entire nest; and if this plan were generally adopted, wasps would eventually be extirpated.

Birds.—Among those which are the greatest enemies to bees, we may mention sparrows and swallows. Set traps near the hives, baited with dead bees; shoot the birds; and hang up a few of such birds as you kill, on trees near the stands. Perseverance for a time in this will rid you of the annoyance.

Bees.—Bees are amongst the most dangerous foes of their own kind, being bold and resolute plunderers. It is only weak stocks, however, that suffer, so that union is the obvious cure. Avoid also placing your hives too close together; and also avoid at any time placing a weak stock near a strong one.

BEE-FLOWERS.—Conspicuous among all the plants loved by bees (for the best of reasons, that they get the most honey or other substances from them), are clover, wild-thyme, heath and broom, borage, French buckwheat, and *Melilotus leucantha.* This last may be usefully grown for the bees' especial gratification. It is easily cultivated, blooms from June to November, and is ornamental in addition to its other good qualities. But the most important qualification of bee-pasturage is, that there shall be always something for the bees, from the very earliest spring to the very latest autumn. It will be useful, therefore, to append a list of bee-flowers.

Spring.—Erica carnea,* winter aconite,* rosemary,* laurustinus, hazel,* snow-drop, crocus,* willow,* osier,* primrose, hepatica, violet, almond, wallflower* (single), borage,* onion, gooseberry, apricot, peach, apple, gooseberry,* currant,* laurel, turnip,* cabbage, etc.,* strawberry. tulip, hawthorn, gorse or furze, columbine, laburnum, berberry,* ribes sanguineum, Dutch clover.*

Summer.—Syringa, helianthemum, annual poppy,* sea-kale, French willow, sweet-brier, bean, yellow lupine, mignonette,* blackberry, chestnut, mallow, lime,* hyssop, teazle, nasturtium, yellow vetch, sainfoin, broom, wheat, viper's bugloss,* raspberry,* symphora, racemosa.

Autumn.—Michaelmas daisy, winter savory, purple houseleek, ivy, honeysuckle, French buckwheat* sowed at midsummer, Spanish broom,* hollyhock,* heath,* sunflower, lemon thyme,* St. John's-wort, melilotus leucantha.*

Those marked with an asterisk are understood to be the flowers especially favored by the bees. What a choice little garden for himself, as well as for his bees, the apiarian may make from the above list, if he does not choose to leave the bees dependent upon the stores of the neighborhood at large!

TRANSPORTING BEES.—Though few, in this country, it is presumed, will adopt the plan recommended in the following paragraphs, yet they are interesting as showing the pains taken elsewhere in the keeping of bees:

"Should the surrounding neighborhood not furnish a sufficiency of flowers, the practice of transportation, or shifting, is strongly recommended by many authors. It is not in the power of every bee-keeper, but as those whose home is placed by a river or canal, have a means at hand for transporting their hives, we have chosen to mention it here. In some countries, boats are built expressly for this purpose. They receive a very large number of hives in each boat, and by traveling for a few hours at night, the bees find themselves in a new country during their working hours, and the hives are rapidly filled with honey and wax of the best quality. The boatmen receive a small sum for each hive that they transport, but we rather fancy that their ingenuity does not rest until it has extracted some portion of the honey from the best-filled hives. The Nile is much used for this purpose, and bees traverse the entire length of Egypt during the summer. In China ducks are subjected to the same migratory life, and thrive amazingly. Hives may easily be carried on men's shoulders, as that mode of conveyance shakes them less than carriage by wagon. Heaths are the best places that bees can possibly live in, and in Scotland there are people who make their living by taking care of hives during the time that the heath is in blossom, a period of about two months, for which time a rent of from one shilling to eighteen pence is paid by the proprietor. It is always necessary while the bees are migrating, to take them at least ten miles during the nocturnal journey, as they are otherwise apt to fly back to the former position of their hive, and to lose themselves in searching for it. The distance to which bees can fly for food is shown in the following anecdote, which has been recently published:

"'A man who kept bees in Holborn, wishing to find out where they worked, sprinkled them all with a red powder as they came out of the hive in the morning. As the heath and thyme were now in full bloom, he at once thought that Hampstead, being the nearest heath, would be the likeliest place to find his bees. As soon, therefore, as his bees were gone away, he hastened to the heights of Hampstead. The walk was a long and toilsome one, of at least four miles, in a July sun. But he trudged manfully on, soon left behind him Camden and Kentish towns, and at last was refreshed with the soft summer breeze sweeping across the purple and golden bloom of the heath. After a few minutes' rest on the green sward, he began his search, and before long was delighted to find there, among thousands of other busy bees, his own little fellows in the dusty red coats, which he had given them in the morning.' Many of the bees made the journey more than twice in each day, thus piloting themselves through sixteen miles of smoke and dust within the twelve hours.

"If the hives are taken by water, they should always be placed on the shore at some distance from the bank, before opening the doors, as they will very probably when returning home, wearied and laden with their burdens, fall into the water before they can reach the hive. If the hives are placed for the season, they should be kept at some little distance from other hives, as if they are weak, their more powerful neighbors will inevitably plunder them."

FUMIGATION.—The following particular description of the manner of fumigating or stupefying bees will enable any one to practice it.

Fumigation implies directing certain smoke of a stupefying character into the hives, so as to render the bees harmless while their combs are being removed, while at the same time no injury is done to the bees themselves. There are several substances which stupefy; tobacco is one, but it is apt to give the wax and honey an unpleasant flavor, and we will, therefore, say nothing about it. The best material that can be used for this purpose, is the lycoperdon, or common puff-ball. A fine specimen of this fungus will grow as large as a child's head. It may be found in almost any field where mushrooms grow. It should always be gathered when nearly ripe, in dry weather, and either exposed to the heat of the sun or placed in an oven until it turns brown and leathery. Some always squeeze it flat during the drying process, as it then can be packed easier, and appears to take fire sooner than if left to dry in any shape it chooses to take. In order to insure its burning freely when lighted, some recommend that when dried, it should be dipped in a very weak solution of saltpetre, and again dried. There are many ways of applying the smoke, but all are useless unless the fungus is retained outside the hive, and only the smoke permitted to enter, as the bees are sure to fall on the burning mass, and thus many will be killed or maimed. Moreover, the operator ought to be able to regulate the amount of smoke poured into the hive. Mr. Cotton, the author of "My Bee-Book," managed it by having a tin box made to fit the nose of a pair of bellows, in which was placed a piece of lighted fungus about twice the size of a hen's egg. There were two openings in the box, one to admit the nose of the bellows, and the other immediately opposite, from which the smoke poured. The box being fixed on the nose of the bellows, and the end being placed against the entrance of the hive, a few vigorous puffs soon fill the hive with the stupefying smoke, under whose effects, after a brief buzz of indignant astonishment, the bees are heard falling as thick as hail, and in a few minutes all is still within.

In performing the work of fumigation, many failures have occurred, from setting about the operation too hastily, or from the non-observance of a few rules that can be easily remembered, and as easily put in practice. In the first place, great care must be taken that the smoke of the fungus or other material used for the purpose is not admitted into the hive at too high a temperature. If this is the case, the heat of the smoke will in the first place scorch and kill the bees, who will rush to the entrance of the hive on the first intrusion of the fumigating tube, and will also melt the wax of the combs, and do considerable mischief. The tube, therefore, should be a very long one, and small in diameter. There is no hurry about the operation, work the bellows quite deliberately, and the danger of burning the poor bees, or spoiling the combs, will be avoided. There is hardly a more pitiable sight than to find on turning up the hive a number of bees lying on the board, with scorched and shriveled wings—a loss of no small importance, as you will want every bee to set to work immediately, to repair the devastations committed in the hive. Another mistake not unfrequently occurs in following Mr. Cotton's directions too literally. It is not sufficient to have the fumigating box made merely of tin, as will most certainly be done if that order is sent to a tinman, for the heat of the ignited puff-ball will speedily melt the solder, and the whole apparatus will fall to pieces. A case of this kind occurred very recently. The box and tube were made according to order, the clay prepared for stopping the entrance of the hive round the tube, the fungus was duly lighted, placed in the box, the bellows fitted, and then vigorously worked. Suddenly, while the operators were complacently puffing away at the bellows, and congratulating themselves on securing both honey and bees by this method, the box fell in pieces, the tube consequently was drawn out of the hive door, and out rushed the bees in a tumultuous state of indignation, thereby putting their would-be captors to an ignominious flight. So, lest you meet with a similar misfortune, give particular orders to have the whole affair made fire-proof, and then you may proceed without the least danger. Of course this must all be done some hours after dark, or the bees who are already out will soon signify their dislike of finding intruders when they return to the hive. It is also necessary to be very quick in cutting out the combs, as the bees do not remain long in their state of torpor or intoxication, and are quite ready on their revival to employ their stings. Always examine the combs that are removed, to see if any bees are left in them, as not unfrequently, when they begin to find that they cannot overpower the vapor, they dive to the bottom of an empty cell, and sometimes are so protected by this precaution, that they revive rather sooner than their less fortunate companions. The wax of the combs thus obtained is much whiter than if sulphur is used, and of course, will fetch a higher price in the market, besides being free from a slight tinge of sulphury flavor, which hangs about them for a long time.

For fumigating, the circular bellows, set in motion by a winch, are much superior to the double bellows, as a constant stream of smoke is introduced into the hive, instead of a series of puffs. Mr. Pettigrew recommends (probably because they can more certainly be obtained when wanted), cotton rags, tightly rolled up in the form of a candle, and applied in the same way as the fungus. If so, it will be found advisable to steep the rags in a solution of nitre, as otherwise they are very apt to go out before a sufficiency of smoke has issued from them. The solution, however, must be weak also, or it may do mischief instead of good, for ignited nitre is apt to send forth sparks, especially if it is urged on by a draught of air. It may be possible that ether or chloroform may answer better than either fungus or rags, but the experiments do not yet appear to have been sufficiently numerous to enable one to speak with confidence. At all events, although chloroform and ether may not supersede fungus and nitre in stupefying bees, the smoke of puff-ball threatens to supersede chloroform and ether in their anæsthetic power as applied to human beings. We are bound to observe that fumigation may not be altogether so harmless as is supposed, and therefore should not be used without necessity.

When, after applying the fumigating apparatus, as has been described above, the stillness that reigns in the hive indicates that the bees are in a state of insensibility, the hive may then be turned up for any necessary operations. If honey is wanted choose the side combs, so as not to interfere with the brood in the center, and be moderate. Replace the violated hive carefully, and the bees will soon recover from their state of partial intoxication, and set to work to repair the ravages that have been made in their stores. Nor does fumigation injure the working power of the bees. Unlike the effects of alcoholic compounds, which when taken in an overdose, entirely prostrate the sufferer for some time, the smoke of the fungus causes a very transient intoxication, which in a few minutes passes away, and the bees appear rather refreshed than otherwise, after their involuntary debauch.

DRIVING.—In the hands of a skillful operator, driving will often be found useful, as it partly supersedes the necessity of fumigation. By driving, the bee-master induces his winged auxiliaries to change their position, by working on their fears instead of stupefying what brains they have. The best method of driving bees will be found in the pages of Bevan, who appears to think very highly of the operation. "Toward the dusk of the evening, when the family will be all, or nearly all at home, and no annoyance be experienced from stranger-bees, let the hive, or box, be raised gently from its floor-board, and supported on three thin wedges; let an assistant be at hand, provided with a tobacco-pipe, or the fumigating box and bellows, from one of which at the moment of raising the hive, let a few whiffs of tobacco smoke be blown into it all round, and a few more after it has been raised. This expedient will soon induce the bees to ascend and congregate at the upper part of the hive. It is next to be inverted steadily on a small tub or peck measure, puffed again, and then quickly and accurately surmounted by an empty hive or box, as nearly of its own diameter as possible. After securely closing the two hives, by tying a cloth firmly round them above and below the junction, so that not a bee may escape, it will be proper to place an empty decoy hive upon the stand where the full hive stood, to amuse any straggling bees that may have stayed out late, or that may escape during the operation. The conjoined hives are then to be removed into a darkened room, in the manner already described, when, if the hive be *well peopled*, and the *weather warm*, by drumming at first gently, and then smartly with the open hands or a couple of sticks on the outside of the hive, the bees will be so alarmed, that in a few minutes they will have ascended into the super. The ascent may always be ascertained by the humming noise attending it. The impulse thus communicated to the bees should be given in the direction of the combs, and by no means upon those parts of the hive which are opposite to their sides, as it might separate them from their attachments."

"The exchange of habitation having been effected, the ulterior proceedings must be regulated by the object in view. If it be wished to have possession of the full hive, it will be simply necessary to leave the decoy-hive in its place, and after covering the honey-combs with a cloth to prevent them from being scented, to carry the bees with their temporary abode toward their usual place of entrance, when, by spreading a cloth on the ground, or on a table, all the bees may be dislodged and made to fall upon it, by a smart stroke with the hands upon the top of the hive, and if one side of the cloth be raised to the resting-board, the bees will gradually ascend, and reoccupy their original station."

Driving is made use of by the Persian villagers, whose hives are made in a cylindrical form, and built horizontally into the walls of their houses, the bees' entrance being outside the wall, and a movable door inside, the end of the hive projecting more than a foot into the room. When the villager wishes for some honey, he drums smartly upon the end of the hive which projects into his room, which causes the bees to withdraw to the other end. The circular lid is then quickly opened, as many combs as he wishes for cut out, and the lid closed again.

No one should be without spare hives or boxes ready to be used when required, even if they do not at the outset fit up a complete apparatus. Thus—

1. A spare box or hive will be ready to receive a swarm obtained in the ordinary manner, with all its picturesque but inconvenient accessories: as, long watching to know the moment of swarming; long runnings, perhaps, to overtake the vagrant young colony, over hill and valley, brake and brier, and amid interminable ear-splitting tumult, which the bees have the bad taste, it is supposed, to like; and the race often ending in seeing the whole cluster safely deposited in a neighbor's apiary, who swears it went from his hive. If you wish to avoid all that kind of thing, do your best to give the bees no motive for such wanderings, and every conceivable reason to stay where they are. Put a decoy-hive ready, with a delicious piece of comb in it (an old hive, with its own combs, will be still more attractive), and it is most likely the scouts sent out to explore will return with such a glowing account of the land of milk and honey they have discovered, that the swarm will be impatient to be off and take possession. This must, however, be done with great care, and the decoy-hive not placed in the air too soon, as

its seductive stores will not only attract the bees who are intended to be its legitimate occupants, but also wasps, hornets, and robber-bees of all descriptions, so that the swarm will have to inaugurate their entrance by a battle.

2. Bees always will settle themselves as soon as possible after swarming, and if they have not already determined upon a new habitation, will fix themselves in the first place that they think will suit them. There are many instances known of bees having swarmed unexpectedly, and after escaping from their former owners, having made their habitation in a hollow tree in a wood, or in the roof of some deserted hovel. There have been several instances of bees choosing to make their nests in the roof or tower of a church, and an instance came very recently under the writer's notice. For several years the congregation had been considerably annoyed by the presence of bees during the service, but had made no particular endeavors to rid themselves of the plague. One summer, however, brought with it such an increase of bees that it was deemed necessary to institute an inquiry; for the winged intruders came in such numbers, and buzzed about so loudly, and frightened the juvenile portion of the congregation to such a degree, that the service could not proceed with any comfort. After some search, a hole was discovered in the roof of the church, through which the bees were constantly passing. This was accordingly stopped up, and the workmen retired, congratulating themselves on getting rid of their winged enemies so easily. They were, however, quite mistaken, for the bees descended in undiminished numbers. The roof was again examined, and found to be in such bad repair, that the colony of bees who had taken up their residence between the roof and the leads had found numerous openings, which they had enlarged for their own purposes. How to eject this formidable band was now the subject of deep consultation. Sulphur-smoke would not answer, because it would soon pass out through the apertures in the roof, and besides, there was a very prevalent alarm lest the church should be set on fire. At last a veteran apiarian was sent for from the next village. He immediately planted a ladder against the exterior wall, and examined the stones until he discovered the entrance to the bees' habitation. It was a mere fissure between two stones, where some of the mortar had fallen out, and the remainder been extracted by the bees for their own convenience. After surveying the prospect for some time, he declared that a stone must be taken out of the wall before the bees could be dislodged, and immediately began to loosen the stone which had already been partly deprived of its mortar. The bees, of course, were highly indignant at such an assault, but the man coolly proceeded with his work, not heeding their anger in the least. When the stone had been completely loosened, he laid by the crowbar, and deliberately pulled it out with his hands. Out rushed a perfect cloud of bees full in his face; but he quietly laid the stone down, and contented himself with brushing them off his face until he had made further investigations. All the spectators took to flight at the first appearance of the enraged bees; but their imperturbable enemy remained quietly at his post, and after descending the ladder pulled some eight or ten bees out of his hair, and remarked that they had not stung him so much as he expected.

It turned out that the man was almost invulnerable to stings; and although several dozen stings or so were in his face, they did not leave the slightest mark, and certainly did not appear to inconvenience him in the very smallest degree. He afterward in the same cool manner extracted the greater part of the combs, and the bees, taking the hint, speedily evacuated the premises. There was but little honey, but abundance of black, worn-out combs, and plenty of young bees in every stage of advancement. It is said that if any one is repeatedly stung by scorpions, the pain diminishes each time, and that at last the system is entirely uninjured by it. An English naturalist was bold enough to try the experiment upon himself, and found that after he had been stung four or five times the pain was comparatively trifling. Perhaps the same may be the case with regard to the bee-stings, and the old man just mentioned possibly owed his immunity to his frequent experience, as Mithridates was said to have completely fortified himself against poisons, by gradually imbuing his system with them.

3. Adopting as a rule the non-disturbance in any serious way of your stock-hive, so that honey and brood shall there at least flourish together, when you think it is full (a solid sound from the hive, and a great long continued buzz from the bees in answer to a tap, is good evidence of that state), attach your side-box, open the communication, and make the bees enter and leave by the entrance to the side-box, which you will do by closing up the entrance to the other at night when the bees are all at home. A little piece of comb, fastened at the top of the side-box, may be at once a useful hint and a temptation to the bees. This box is to be kept solely for honey-combs by ventilation, which prevents the queen from laying eggs in it. When the heat in the side-box is 70°, you should admit air through the top by means of a piece of tin pierced with holes. A draft through the hive, from the entrance to the roof, now takes place. This must not be done until you see the bees have fairly passed the Rubicon, and have done and ventured too much to be inclined to retreat to the stock-hive. When the box is full, you can take it away, and replace it emptied, or by another, or by opening a communication to a similar side-box on the opposite side, as in Mr. Grant's hive. The bees in it will soon flock to the queen in the parent hive. This arrangement prevents swarming, or at least has a great tendency to prevent it; as the bees have more room given to them just when they want it. It also raises the stock itself to the highest state of prosperity, as only the surplus honey is taken away, and the brood is not interfered with.

4. But if you wish to have an increase of stock without the inconvenience of natural swarming, you may easily do so by treating the side-box exactly the same as the chief one—that is, by leaving it unventilated. Brood as well as honey will then be deposited in it, and you have only to watch for a favorable opportunity of securing two stocks. This should be a little before the natural period of swarming, of which the signs are, clustering on the outside, activity and commotion among the drones, inactivity of the workers, portentous silence in the hive in the day (during which the prudent bees are supposed to be filling their pockets with provisions for their journey), and a singular hum-

ming noise at night, presumed to come from the young queen-bees announcing their advent. But these warnings apply less to the first than to the subsequent swarms. However, there is a pretty good rule for effective action. As soon as you find the side-box is nearly full, watch for an opportunity when the queen, with about two-thirds of the bees of the colony, is in the side-box, then cut off the communication with, and remove, the parent hive three or four feet distant, and put an empty hive in its exact position. The returning bees will flock into the side-box as before, and that hive is done with. As to the parent-hive, the nurse-bees will take every care of the brood in it; in fact, they will be just as though a swarm with the queen had left them; and will proceed with due equanimity to supply her place in the approved way. This is the mode practiced with success by Mr. Grant, and may be varied according to circumstances. For instance, if the queen should not have been left in the side-box with the greater portion of the bees, and has, therefore, been removed with the parent hive, the rest must be in effect the same, as regards the two hives; most of the bees then might leave the side-box and flock to the queen in the parent-hive; but if there be a brood in the side-box, it appears that the nurse-bees will not desert it, and, therefore, there are still two communities, and both well provided with all they require for a new start in life.

5. There is also practiced, it is said with great profit, a more summary way of proceeding to make an artificial swarm, which consists in fumigating the bees, in order to divide them into two bodies as before. The period chosen is from the beginning of May to the middle of July, and when there are as many bees on the board at the bottom as will fill a thirty-two (eight and a half inches by six) sized flower-pot. To ascertain this, blow a little smoke into them and turn up the hive. Before commencing operations, place the hive intended for the new colony on the stand, with a bit of comb in its roof, and a stick across the middle to aid in the support of the combs. If you are short of hives, this one may be used instead of an additional empty hive in performing the operations about to be described. But the bit of comb may be somewhat in the way. The bees having been stupefied by the fumigation, the hive is turned up, its top rested on the ground, and an empty hive placed over it of exactly the same shape (at the edges at least), and a cloth tied round the circle of junction. Then tap or drum gently at the sides of the two hives for about ten minutes, in which time probably about two-thirds of the bees will have ascended into the upper hive. The queen, fortunately for the operation, is generally one of the first either to run away from or to confront the danger (we know not which it is) by ascending. If your hive have a glass window, as all should have, you can see when about the right proportion have ascended; if not, you must guess with the aid above given of the knowledge of the ordinary duration of time occupied. Now take off the top hive and reverse it also on the ground, while you make sure the queen is there, throwing, meanwhile, the cloth (that you have removed) over the exposed bottom of the parent hive. If the queen be there (and she is easily distinguishable) you have only to shake queen and bees into the prepared hive on the board, and restore the parent colony also to the ordinary resting-place, where the bees will soon rear

a new queen for it. If the queen be not there, then repeat the process with the prepared hive, and so you will catch her at last. You can then return the first batch of bees that were removed either to the parent hive or to the prepared hive, by simply shaking them into the one which most needs them.

Old hives thus deprived of their queens, and made to rear new ones, involve another important advantage. In twenty-one days the entire brood will be reared, no fresh brood having been deposited (through the absence of an old queen), and the young queen not having begun to lay, which they do in about ten days after they leave the cell. Here, then, where the hives are heavy, say forty or more pounds in weight, is an opportunity of removing the bees (by fumigation) into a new hive, and selling the contents of the old one. The honey is thus earlier than usual in the market, and fetches a higher price. Weak swarms should invariably be joined either to strong ones, or to each other, and as soon as possible after swarming. It is only a strong community that can so successfully establish themselves before winter, as to be in no danger from its severity. This junction may be performed by fumigation, and taking away one of the queens. A stock without a queen may by the same means be added to one that is more fortunate: and this applies even to the restoration of a swarm to its own parent hive if there be ample room in it.

We have said nothing of the plan of annually destroying the bees, for it is almost an insult to our readers to suppose they would approve of so senseless and unprofitable as well as cruel a practice. It is quite true that thus all the honey that is made in a season may be obtained at once, just in the same way that all the golden eggs of the goose in the fable were to be obtained at once. And if this wholesale deprivation be desired, it is perfectly obtainable without destroying the bees, by simply fumigating them, and removing them to another hive. And if you don't choose to feed the bees during the winter, let somebody else have them that will. It is possible, in a favorable late season, they may not need any assistance. At all events, let it be the golden maxim of bee management never to allow a single bee to be injured if you can help it.

We close our article upon bees with the quaint story of an old English apiarian.—"In or about the year 1717, one of my swarms settling among the close-twisted branches of some codling-trees, and not to be got into an hive without more help, my maid-servant, hired into the family the Michaelmas before, being in the garden, very officiously offered her assistance, so far as to hold the hive while I dislodged the bees, she being little apprehensive of what followed.

"Having never been acquainted with bees, and likewise afraid, she put a linen cloth over her head and shoulders, concluding that would be a sufficient guard, and secure her from their swords. A few of the bees fell into the hive; some upon the ground; but the main body of them upon the cloth which covered her upper garments.

"No sooner had I taken the hive out of her hands, but in a terrible fright and surprise, she cried out the bees were got under the covering, crowding up towards her breast and face, which immediately put her into a trembling posture. When I perceived the veil was of no further service, she at last gave me leave to remove it. This done, a most affecting spectacle presented itself to the view of all the company, filling me with the deepest distress and concern, as I thought myself the unhappy instrument of drawing her into so great and imminent hazard of her life, which now so manifestly lay at stake.

"It is not in my power to tell the confusion and distress of mind I was in, from the awful apprehensions it raised; and her dread and terror in such circumstances may reasonably be supposed to be much more. Every moment she was at the point of retiring with all the bees about her. Vain thought! to escape by flight. She might have left the place indeed, but could not the company, and the remedy would have been much worse than the disease. Had she enraged them, all resistance had been vain, and nothing less than her life would have atoned for the offense. And now to have had that life (in so much jeopardy) insured, what would I not have given.

"To prevent, therefore, a flight which must have been attended with so fatal a consequence, I spared not to urge all the arguments I could think of, and used the most affectionate entreaties, begging her, with all the earnestness in my power, to stand her ground, and keep her present posture; in order to which, I gave encouragement to hope, in a little space, for a full discharge from her disagreeable companions; on the other hand, assuring her she had no other chance for her life. I was, through necessity, constantly reasoning with her, or else beseeching and encouraging her.

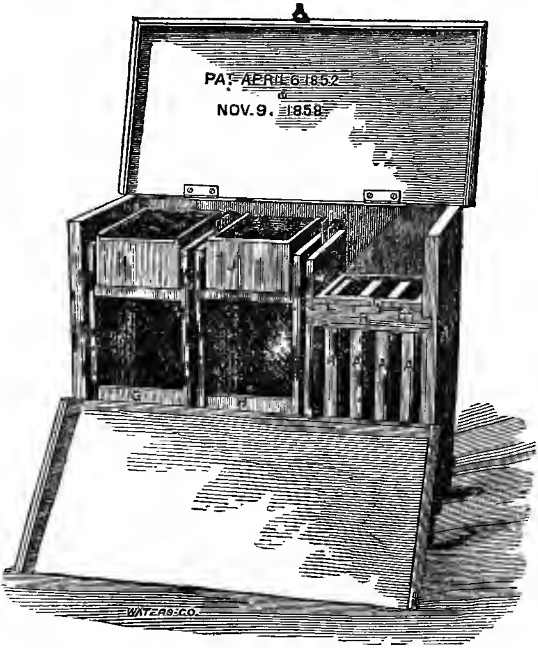
"I began to search among them for the queen, now got in a great body upon her breast, about her neck, and up to her chin. I presently saw her, and immediately seized her, taking her from the crowd, with some of the commons in company with her, and put them together into the hive. Here I watched her for some time, and as I did not observe that she came out, I conceived an expectation of seeing the whole body quickly abandon their settlement; but instead of that, I soon observed them, to my greater sorrow and surprise, gathering closer together without the least signal for departing. Upon this I immediately reflected, that either there must be another sovereign, or that the same was returned. I directly commenced a second search, and in a short time, with a most agreeable surprise, found a second or the same; she strove, by entering further into the crowd, to escape me, which I was fully determined against; and apprehending her without any further ceremony, or the least apology, I reconducted her, with a great number of the populace, into the hive. And now the melancholy scene began to change, and give way to one infinitely more agreeable and pleasant.

"The bees, presently missing their queen, began to dislodge and repair to the hive, crowding into it in multitudes, and in the greatest hurry imaginable. And in the space of two or three minutes the maid had not a single bee about her, neither had she so much as one sting, a small number of which, would have quickly stopped her breath.

"How inexpressible the pleasure which succeeded her past fears! What joy appeared in every countenance upon so signal a deliverance! and what mutual congratulations were heard! I never call to mind the wonderful escape without a secret and very sensible pleasure. I hope never to see such another sight, though I triumph in this most noble stand and glorious victory."

HIVES AND BOXES.—Various improved hives and boxes have, from time to time, been invented and more or less used, giving greater or less satisfaction; yet among them all, we regard *E. W. Phelps's Combination Hive** as one of the best. It was first patented in 1852, and during the past year has been greatly improved. It is true that his hives are *patented*, and many are disposed to look with disfavor upon *all patents.* However, we are too much indebted to the protection afforded by our patent laws, for the many and important inventions in all the arts of life, to render any refutation necessary of the futile objection.

FIG. 1.



PHELPS'S COMBINATION HIVE.

These hives are made in four different forms and styles, to suit the views and wants of persons in different locations and circumstances,—the prices varying from $2.50 to $15.00. The latter is a "non-swarming hive," made with a mahogany or rosewood case in imitation of a beautiful wash-stand, and intended to be set in a gentleman's office or dwelling. The others include swarming and dividing hives, in different

* These hives are manufactured at Elizabeth, New Jersey, where information concerning them can be obtained.

styles and finish—some with boxes, others composed of "*improved, movable, sectional frames*," and others combining the two principles—using a square box for the brood hive and "sectional frames," and small honey boxes for obtaining the surplus honey.

We believe the following illustrations and descriptions of these hives will be acceptable to our readers.

Fig. 1 is a hive containing the two principles combined; with the top and back opened, showing the internal arrangement. The boxes G and H, with the honey boxes I and J on the top, represent the "*Combination Hive*," patented 1852. That part occupied with the "*Sectional Frames*," AAAA is the late improvement of Mr. Phelps, also combining the two improvements, by using one box (H) for the *brood-hive*, with three or four of the frames, AAA, placed by the side (as seen in the engraving), with communications from the brood-hive to the frames, which are easily opened and closed at will, by means of a thin slide between the apartments. The advantages secured by the use of the small frames, in the place of a large honey box, as formerly used, is, in obtaining the surplus honey in a much more desirable condition, either for family use, or for market: as it is stored in the small frames in separate pieces, five or six inches square, in which condition it is taken from the hive without cutting or marring the combs, and can be kept in the frames until used.

The arrangement for freeing the honey and frames from the bees is a matter worthy of note, as all that is necessary to be done is, to close the communication between the apartments with the slides, and insert a long tin exit tube in the front of the hive, so that the bees must pass out *through the tube*, from the apartments containing the honey-frames, and in returning to the hive, will enter the *brood* apartment through a more open space. In this way the bees are soon cleared from the honey, leaving it free for removal, without resorting to smoking, driving, etc.

The main brood-hive (H) is occupied by the bees as their *permanent* residence, and is about one foot square in the clear, in the hives as now made. It is divided into two equal parts, and joined at the center by means of small dowels of wire, so as to be separated at will. In each apartment there is either a *sectional frame*, or *guide bars*, attached at the adjoining edges, in which the bees construct their combs, parallel with the separating joint, so that either half can be removed at will, without cutting or marring the combs, while at the same time there is no partition in the hive to separate the combs or bees; consequently, they construct their brood-combs equally in each half of the hive, and when either is removed, there is a certainty of obtaining about one half of the brood-combs—an advantage not secured in any other arrangement that has come under our notice.

The tops of these hives are so constructed that by means of a late improvement the bees *cannot* construct their combs *across* the frames or bars. This is a very important feature in these hives, for, unless the combs are constructed straight on the frames or bars, and *parallel* with the joint of separation, the hive could not be taken apart without marring the combs and injuring the bees. It is also very important, in connection with the "movable frames," as here much difficulty has been experienced;

and in numerous instances the "movable frames," *as constructed in other hives*, have been rendered *entirely useless*, as far as removing the combs is concerned, on account of the bees building their combs *across* them, fastening them all together. It will be observed, that while the bees are altogether in this "*dividing-hive*," the same as in any square box-hive, and occupy the central part with their brood-combs, as is their custom, *either part* can be removed at will to obtain a portion of the honey or the old brood combs; or, the colony may be *divided*, at the proper season, and stocks multiplied without the trouble and risk attending swarming, whenever there is a sufficient quantity of bees to justify it

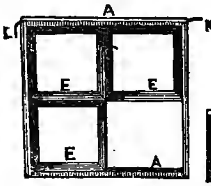


Fig. 2.

Fig. 3.

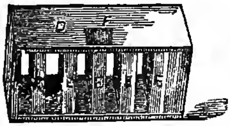


Fig. 4.

Fig. 2 is a side view of one of the frames (A) taken out. Inside of this are four smaller frames (EEEE), each one of which is about six inches square. The frame A is now dispensed with, and a more simple and cheap manner is employed of connecting the "*sectional frames*" by means of small wire hooks, thereby saving the space occupied by the large frame, and the expense of making it.

Fig. 3 is one of the sectional frames taken out.

Fig. 4 shows several of the smaller frames EEE, arranged in a box to be placed on the top of the hive when desired. In operating with the bees, the frames can be removed, replaced, or shifted, as circumstances may require.

We think every practical bee-keeper will see at once the advantage secured by the use of these small frames, over the large movable frame as constructed by others, for the honey taken from the hive, in the large frames, is in combs some twelve inches square, very inconvenient to handle or take to market, while in the small frames, the honey is in the most beautiful and convenient form possible, to use in the family, or retail in market; being in separate pieces about five inches square, weighing from one to one and a half pounds per frame, in which condition it may be kept until required for use; and one comb used at a time, without moving others. He also manufactures a plain low-priced *non-swarming hive*, the case constructed the same as shown in the engraving, only longer and higher, to afford ample space for all the bees to labor and store honey in one apartment. The interior of this hive is composed entirely of "sectional frames," placed side by side and one above the other, three or four tiers high, to the number of one hundred or more of the small frames, with no partitions or divisions between them, where the bees all labor in a mass, storing the honey in the frames; when at the close of the honey season it may be removed in the frames without moving the combs, or injury or exposure to the bees. This hive is so constructed, that, if desired, the bees may be confined to a space of one foot square, and the hive converted into a swarming hive.

The hives are all well ventilated at top and bottom, and the bottom being attached with butts and buttons, is easily let down and cleaned, without disturbing the bees. There is also a most ingenious and effectual device for destroying the bee-moth, attached to the bottom of the hive, affording the moth or worms a most convenient harbor, or hiding-place in which they are sure to secrete themselves, when the trap can be withdrawn and the worms destroyed without opening the hive or disturbing the bees.

A "*non-swarming hive*," combining the foregoing advantages has long been sought for, as there are many persons who have never kept bees, that would gladly do so, if swarming and the trouble attending it could be avoided. And as the backs of these hives are glass, they afford a good opportunity to observe the operations of the bees without exposure to them. It is an interesting sight to observe a good populous colony of "busy bees" at their labors in the hive, during the season for gathering honey, and the pleasure is increased by the reflection that we are to share with them in the products of their labors.

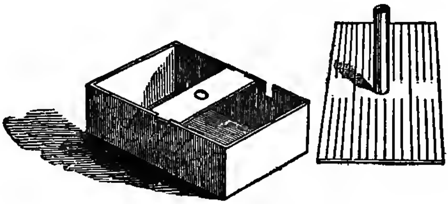
Another important advantage which these hives possess over those in common use, is, that the tops are composed of frames, or bars, on which the combs are attached, admitting a free circulation of air between all the combs, so that all the moisture and vapor, caused by the breath and warmth of the bees escapes freely up between them, keeping them dry and healthy, and free from mildew or mould; and it is strongly recommended to take off the honey boxes during winter, to give free ventilation, and prevent frost accumulating in the hive.

These hives are also well adapted to set in a building, on account of the peculiar construction of the entrance for the bees, and the alighting board, which forms a tube or spout to conduct the bees through the side of the building, or out at a window of a dwelling, without admitting them into it, to interfere with any one. Many persons are using these hives in their dwellings and offices. In most instances they are made in imitation of an inclosed washstand, and can be opened and all the operations of the bees observed without danger from them, and the honey obtained in tumblers or glass jars, or, in the small frames, or boxes.

We also give a brief description of Mr. Phelps's "bee-feeder." This is a very simple and practical arrangement for feeding bees; and as used in these hives obviates all danger of other bees robbing the colonies, or swarms, while being fed—a point of much importance, as generally, there is great danger of other bees being attracted to the hives by the scent of the feed, and, as it is the weakest and smallest families that usually require feeding, they are not able to defend themselves against the attacks of their more populous neighbors; and consequently, the robbers will enter the hives, and in a very short time, carry off all the honey it contains; and hence more injury than good has, in most cases, resulted from attempting to feed, for robbing one hive, does not satisfy the burglar bees, but encourages them to attack the next feeble colony, and not unfrequently several stocks will thus be destroyed before their depredations can be stopped.

This feeder is so constructed and arranged, and so harmonizes with the construction of the hives, that there is little or no danger to be apprehended from other bees being attracted to the hive or gaining access into it or to the feed, as the feeder is placed in the case, at the side of the brood-hive, near the top, with a small communication into the feeder, near the top of the hive, and therefore the robbers must pass up among the bees and combs through the body of the hive, to gain access to the feed. This they will not do, if the instructions are followed, which are: "*to nearly close the entrance tube while feeding*, leaving a space of only half an inch or so, that only one or two bees can enter at a time." In this condition a few bees are able to defend themselves against all intruders.

FIG. 1. FIG. 2.



FEEDER AND FLOAT.

Fig 1 is a view of the feed-box. Fig 2, the *float* which is made to fit in it, to support the bees and prevent their becoming mired in the feed while feeding.

Fig. 1 consists of a wooden box made of half-inch boards, and is ten or twelve inches long, six inches wide, and four and a half inches deep, having one or two apertures an inch or so in diameter, near the upper edge, to communicate with the hive while feeding. A square tin pan, two inches deep, is made to fit closely in the box, even with the bottom, and secured there with small tacks.

The float, fig 2, is made of thin slats of light wood, about one inch wide, and one eighth of an inch thick, tacked on to a cross piece at the center, leaving a space between the slats of one eighth of an inch. The under side of the float is lined with strips of cork one eighth of an inch thick, tacked to the wood. A hole, five-eighths in diameter, is made in the center of the float, and a tin tube five inches long fitted in even on the under side. Another thin strip two inches wide is fitted across the top of the box, with a hole in the center one eighth of an inch larger than the tin tube, to receive it; and on each side of this top strip, a pane of glass is fitted to *confine* the bees, and afford means to observe their operations while feeding. By means of the tin tube, the float can be raised when the feed is put in the feeder, and the feed poured through it with a tunnel. The float can then be eased down on the feed, and the bees come on to it and feed through the apertures between the slats without being mixed and drowned in the feed. It is *surprising* and also *amusing*, to see how eager they are to remove the feed and store it in the hive. An ordinary family of bees will frequently remove a pint of the feed in an hour, and usually from one to two quarts during a night; and it does not retard them in the least from gathering from the field on the following day.

The feed may be made of poor, unmerchantable honey, or honey and sugar *mixed*, and prepared with water. Southern honey also answers a very good purpose for feeding, merely to sustain the bees through the winter; or, when cleansed and mixed with crushed sugar, makes a very good article for the table, *after being worked over* and stored in the combs by the bees. They also construct combs from the feed, as white and beautiful as any other. For feeding receipts see *ante*, page 285.