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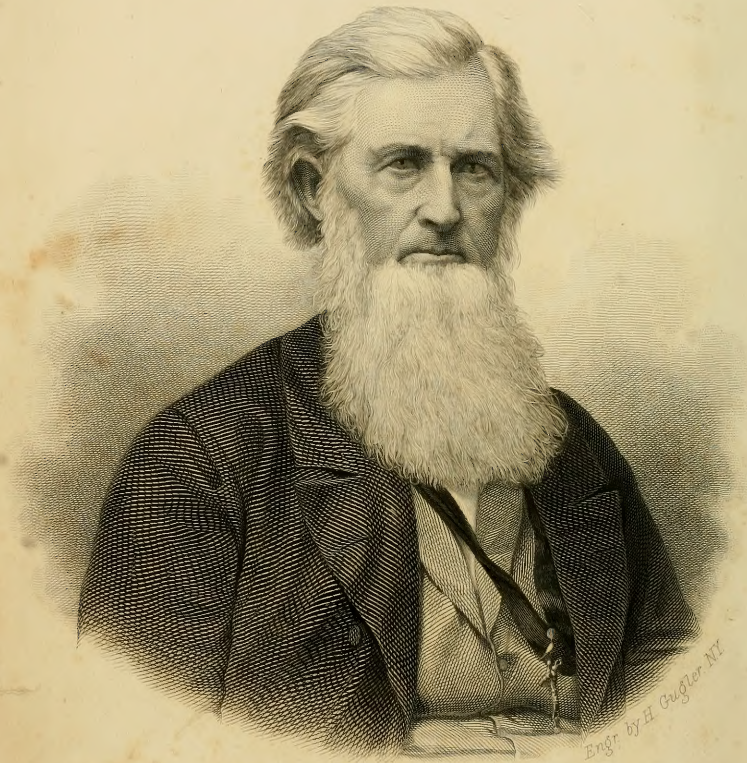

Your old friend,

Solon Robinson.

FACTS FOR FARMERS;

ALSO FOR

THE FAMILY CIRCLE.

A COMPOST OF RICH MATERIALS FOR ALL LAND-OWNERS,

ABOUT

DOMESTIC ANIMALS AND DOMESTIC ECONOMY;

FARM BUILDINGS;

Gardens, Orchards, and Vineyards;

AND ALL

FARM CROPS, TOOLS, FENCES, FERTILIZATION, DRAINING, AND IRRIGATION.

Illustrated with Steel Engravings.

EDITED BY

SOLON ROBINSON,

AGRICULTURAL EDITOR OF THE NEW YORK "TRIBUNE," AND AUTHOR OF SEVERAL POPULAR WORKS.

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PREFACE.

THE AUTHOR TO HIS READERS.

"FACTS FOR FARMERS?" "What facts?" "What new theories have we here in a ponderous volume? Is it filled with dry dissertations about what farmers should or should not do?" "What does this author know about farming?"

The author answers—the last question first. Nothing. Who does? He does not advance new theories. He only collects old ones. He *has* made a ponderous volume, not of dry dissertations, but of short, crisp facts. The book is full of little things; gleanings from many fields; from all the agricultural papers; from conversations of farmers; from talks at farmers' clubs; from books a little; from personal experience much;—from the memory of a long life devoted to the practice and study of agriculture, this volume is born. It is the fruit of years of labor in a great and good field. It certainly contains much that will be useful to all classes who till the earth, or live in farmers' houses. It should be in every rural home, as a work of reference. It is arranged in the most convenient form for this purpose. Each chapter comprises one general subject. Each section embraces a separate branch. Each numbered paragraph is complete in itself, and conveys an item of information. Each subject is completely indexed. As a whole, though containing much, it is not an encylopedia of agriculture. It does not pretend to teach all that a farmer should know. That must be learned by daily perusal of agricultural papers and books.

Though not perfect, farmers will find this book a useful one. If not invaluable, I hope it is one that they can not afford to do without. In its compilation, the author has enjoyed many facilities and much experience; he has also labored under many difficulties, while daily engaged as an agricultural editor of a great daily and weekly paper. You will find here stored up for future use many of the valuable little items that you have read approvingly in the TRIBUNE, and many from other sources, useful to every farmer's family, and worthy of preservation.

Usefulness instead of elegance has been aimed at. I have given more facts than theories. I have often given the opinions of several upon the same subject, and, as some of these vary, I leave the reader to adjust differences.

In trying to avoid diffuseness, I have left much for inference, and purposely treated subjects in such a manner as to induce readers to make further research. A word of explanation. At the end of the volume you will find a list of agricultural papers, which the author had read for years previous to the commencement of this compilation. Also a list of individuals, some of whom are eminent authority in agricultural knowledge. From all these he has drawn matter, sometimes with, and sometimes without, credit to individuals, when facts have been condensed from their articles. Conciseness has been a study; else, how could twelve hundred subjects be crowded into a thousand pages? Those whose articles I have used, must not complain that I have pruned too closely, or failed to give credit in all cases where credit is due. I freely acknowledge my obligations to all.

This book is one that may be opened at any page, profitably, to occupy five minutes' leisure. It is printed in such large, clear type that it can be easily read. The author and publisher hope that it will be. Then it is illustrated as no agricultural book published in America ever has been. Look at the many large, handsome, steel engravings! These alone are worth the cost of the whole volume.

Farmers! you are earnestly invited to read, if nothing more, the titles and contents of chapters, and their subdivisions of sections. If you do that, and find nothing that promises instruction, lay the volume aside. If so far it is promising, turn over its pages, glancing at the black-letter titles of paragraphs. Of one thing be assured; lengthy as the volume appears, it is not made so by extreme dilution; the last chapter is better than any that precedes it. Throughout, no subject is lengthily treated; no subject is treated that does not contain something useful to some one; something that you can not always remember, but which you should always have at hand, convenient for frequent consultation.

To those who know the name of the author—and the number is large—I hope this book will be a welcome bequest. I hope it will be the means through which that name may live in love and honor with your children and children's children around many an American hearthstone.

Of the author's portrait, a word. It is the publisher, and not the author, who inserts it. It represents him correctly, as he is at the age of nearly sixty.

In conclusion, I earnestly hope these FACTS will be an acceptable offering to a very large number of those whose prosperity I would promote, for I am one of the BROTHERHOOD OF AMERICAN FARMERS. To them it is commended, with the love and respect of their old friend,

SOLON ROBINSON.

NEW YORK, *May* 1, 1863.

PLATE I.

(The Frontispiece.)

This is the genial face of a farmer, engaged in a work of love for his calling. It is placed here in opposition to the wishes of the author. He has been persuaded to allow his face to be seen by those who purchase this collection of things useful to a very numerous class through the solicitation of the publisher, who knows that it will be a satisfaction to them to see how their old friend looks at the age of sixty. An old friend he will seem to those who read his earnest appeals for agricultural improvement twenty or thirty years ago. As a writer and lecturer upon agriculture, and extensive traveler to observe its condition in the United States, few men are better known than the original of this portrait. Therefore this likeness will be, the publisher believes, highly appreciated as well by those who look upon a familiar face as those who see it here for the first time.

The author was born a farmer, and will probably end his days where he now lives (a few miles out of the busy hum of the city), in the peaceful quiet of his "home in the country," where this volume of facts for farmers has been prepared as a last legacy of his good-will to the brotherhood.

Like other farmers' sons of New England, he learned to follow the plow there, though in early life he became a Western pioneer, and while a prairie farmer, became widely known as a writer advocating agricultural improvement, and more widely, in 1841, as the originator of the National Agricultural Society, and earnest advocate of State and County societies. His connection with the New York *Tribune* since 1850 will make this picture interesting to all its readers. It is for these reasons that the publisher has incurred the expense of its production.

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Every American farmer will look upon this picture with pride. It is a fitting illustration of a chapter upon Domestic Animals. It contains representatives of a well-stocked farm, assembled in the farm-yard on the south side of one of the farmery buildings in one of the sunny days of spring, which are so well calculated to make such a collection of well-fed animals feel, as these look, full of gladness. There is no danger that such hogs as these will destroy young lambs and poultry. Here we see the sheep and lambs, goats and kids—goats that yield valuable fleeces, which are described in this chapter—the work-horses and brood-mare and colt—the mules and their progenitor, who is in an attitude of war with a well-fed heifer that is absorbed in admiration of the peacocks on the roof of the poultry-house. How surlily the bull looks upon the white-faced cow, which is deeply interested in contemplating the two hens that the cock has just called to enjoy a few grains of corn! By the earnest looking of one cow and two horses, we judge that they see their good friend and master approaching. Geese, ducks, turkeys, rabbits, and pigeons, and a boat on the water, enliven the scene, which, altogether, is one of tranquil beauty. It is a scene to contemplate and admire. It teaches a lesson. It will stimulate many a young man to a determination to become the owner of such a one, or something equally worthy of the artist who desires to represent American farm life. It will stimulate all, we hope, who look upon this pictorial index of this chapter to read it carefully.

AN AMERICAN FARM-YARD.

FACTS FOR FARMERS.

CHAPTER I.

DOMESTIC ANIMALS.

SECTION. I—INTRODUCTION TO FACTS ABOUT STOCK.

THE very foundation of all farm improvement is the domestic animals which consume the coarse products of the farm, such as are not fit for human food, or grown in greater abundance than is needed for that purpose, which, being so fed, are converted into milk, butter, cheese, beef, pork, mutton, wool, leather, and the many other valuable animal products. But above all are animals valuable to the farmer, because they convert the coarse products of the farm into manure, without which the owner can not produce food for his own sustenance.

Viewing, then, as I do, successful farming as based upon stock, it seems to me very fitting that I should make the treatise of it the leading chapter of the volume. And as swine are more universally kept by all classes of Americans, and the flesh more universally used every week in the year, it will be very proper to make this branch of farm-stock the leading subject.

I am not going to give learned dissertations upon stock-breeding, nor, in fact, long essays upon this or any other subject, but such little fugitive facts as come to hand, in short paragraphs, consecutively numbered for reference, with black-letter titles to each subject, to attract attention, and so arranged that facts may be gathered at a glance, and valuable information obtained during leisure moments which might otherwise be lost.

Many of the statements given are not only for the purpose of giving interesting information—such, for instance, as the weights of the largest animals ever slaughtered—but as an incentive to others to try to produce the like. It is not to be expected that a man who never saw a bullock of over 12 cwt. should attempt to make one of 36 cwt.; nor will he be likely to make the attempt before he learns the important fact, that the particular breed which he has kept all his life never attain that weight.

It is for the purpose of inciting improvement that I give some statistics of the New York livestock market, which I have been familiar with for many years. Farmers should know that there is a certain market for all the meat-giving animals they can produce, and what they realize, as well as what varieties sell best.

I have purposely adopted a desultory method, because I think it will be more satisfactory to my readers, whom I do not expect to read the work in consecutive order, and because I find it more convenient to pick up the fugitive facts and jot them down in a sort of mosaic-work, something as nature does its autumn tints, which are now glowing before my window in the full effulgence of an October sun.

And here, too, as I look abroad upon my neighbors' fields, and at their cattle gnawing the short pasture, and running after every chance apple dropping from the trees, and then stretching up their necks, looking for more, and browsing off the lower limbs of the trees, I am forcibly reminded that this is not a profitable method of keeping farm-stock. Day by day the milch cows fail to give the supply that good pasture will always give in this good butter-making month of October; and day by day the flesh of all the animals is wasting, so that, by-and-by, when the cold and storms of November force their owner to bring them into winter quarters, they are not in such a condition that he may carry them economically through. There is a great error in farming, that the scene before me forcibly reminds me of—it is the error of keeping any kind of farm-stock upon short pasture, and most particularly in autumn, so that they come to winter quarters falling off in flesh, rather than gaining, which is the condition that all animals should be in when brought from the pasture to the stable or feeding lot.

Some of the farmers of the Eastern States of the kind just alluded to, who keep their stock upon the shortest possible pasture, and consequently generally have scrubby animals, and always meet with great difficulty in wintering those, would learn a useful lesson if they would visit the blue-grass pastures of Kentucky, and see in what luxuriant feed the sleek Durhams of that region are kept. They would there learn one of the secrets of value of that breed, and why they attain at three years old a size and weight of beef never equaled at six years old by the scrub breed common in Virginia and in the hilly regions of Ohio and Indiana, which are sometimes designated in the New York market as "pony cattle," or "old style," and averaging, when fat, about six hundred pounds in the beef. A similar scrub breed is known in Kentucky as "mountain cattle," and the same style is very common in North Carolina, Georgia, and other Southern States, where I have often seen full grown steers, and fat, killed for beef at four years old, that would not average four hundred pounds of beef. These cattle were treated, too, all their lives, just like too many of the same class in all the New England and Middle States—like those now before me, eking out their existence upon the scanty herbage of autumn, in a closely-cropped summer pasture, and never fed with forage prepared for winter, until the owner is driven to it by an early winter storm.

Such is not the right way to keep stock; but so long as men will keep it thus, it is not of much advantage to try to improve the breed.

There is a great want of information, not only upon the subject of improvements in the kinds of stock, but in the modes of keeping it. It is not my intention, in this chapter upon domestic animals, to attempt to give all this information, but only a few brief hints, which may lead to reflection and improvement.

Above all things that will tend to improvement, are annual visits to great cattle-shows, where the varieties in the breeds of cattle may be studied, and judged as to which would be the most profitable, or whether either would be more so than the old-style breed at home.

It would be of great importance, too, to all farmers to travel more. How strange it would seem, at first sight, to a Yankee farmer, who had occupied a forty-acre farm all his life, to see a thousand hogs, and half as many bullocks, all turned into a grand-prairie corn-field, of a size large enough to cover his entire farm and that of twenty or thirty of his neighbors! His first exclamation would probably be, "Oh, what a waste!" His subsequent opinion would be about like this: "Well, after all, I begin to believe that is not so bad a way of harvesting corn as I thought it was."

And this is not the only curious thing that he might see in relation to farm-stock in traveling through the West. He would see the same bad management as at home, about bringing the stock into winter quarters, for they are too often allowed to run in a corn-field, after the grain has all been harvested, living upon the dry stalks until after the first snows of winter. He might also see some very amusing, as well as instructive things, in connection with cattle.

Shipping cattle on a Mississippi steamboat, as I once witnessed, afforded infinite amusement; and I am disposed to give a photograph of it, before I take up the more practical details of farm-stock.

Engagements for boats to stop and take cattle on board at various landings are frequently made before leaving port, and it often happens that the boat reaches these points in the night; and then a scene occurs which might employ a more graphic pen than mine to describe, or which would have been a fit subject for Hogarth to paint.

I will try to give my readers some idea of such a scene, although one so common on the Mississippi it rarely meets a passing notice; yet it is full of interest.

The steamer left St. Louis about sundown of a dark day, during the latter part of which the rain came down in torrents, corresponding to the size of the great river they were destined to fill. Of course mud was a component part of all the little tributary streams; but it did not discolor the great river—that is always muddy.

At ten o'clock we saw a light on the right bank, and run in for it. Though the rain had ceased, the night was dark—one which gave the pilot but little chance to see any but the most prominent landmarks.

"Whose place is this?" sung out the captain, when he had approached as near the light as he thought safe—for in time of "a fresh," the master of a boat always approaches shore with great care.

"Why, dis is my massa's place; what boat dat? If you is de Henry Clay, den dis nigger mighty glad, 'cause, gorra, cap'en, hab been watching all dis two free nights for de old Clay."

"Have you got your cattle there?"

"All in de lot—gorra bress you, den you is de Henry Clay, sure—right here by de light."

"Is the water good in shore?"

"Why, spec him is good for the steamboat, but not very good to drink."

"How deep is it near the bank?"

"Oh, Lord, massa, dat mor'n dis nigger knows for sartin, 'cause him mighty deep."

"That will do. Forward there. Get your lines ready. Light them torches—let's see where we are. Call all hands; here is a hundred head of cattle to be got aboard."

In a few minutes the lights flashed a bright glare over the boat and shore, bringing to view a scene worth a long journey to behold. The torches are composed of "light wood," which is the concentrated pitch of old pine trees, of the long-leaf variety—the richest of all the family in turpentine. This wood is split in small pieces and put in an iron frame, with a staff not unlike the common hod used to carry mortar, so it can be carried about or stuck in the ground, where by a little replenishing it will burn for hours, giving a light unequaled by any other portable contrivance I ever saw. In the present case, it disclosed more mud than anything else. The whole bank was alluvial clay loam. The face was steep, and sixty or eighty feet high. The boat, made fast to stakes driven into the soft earth, lay within twenty feet of the shore, between which and the guards was a gangway made of long planks lashed together, about six or eight feet wide, without side-railing, or anything to prevent springing down in the center. The cattle were in a yard on the top of the bank, where, around the watch-fire, huddled about a dozen sleepy negroes, amongst which the anxious face of massa soon made its appearance, having been awakened at his house, two miles distant, by the tremendous noise which is made by one of these river steamers, by the puffs of her high-pressure engine.

"Halloo, Captain Smith, is that you? I might have known it, though, for no other fool would come here in the night for such a job as this. What are you going to do—hold on till morning?"

"Hold the ——!"

"Well, I might just as well as hold you. I do believe, if the Clay's engine should break going up stream, the boat would not stop—there is steam enough in the captain to keep her going."

Evidently pleased with this compliment, he jumped ashore, with that most encouraging of all words, "Come, boys," and floundered up the muddy road, to greet his planter friend with one of those hearty shakes of the hand which alone is equal to a whole volume on the man's character.

"Well, captain, you see how it is. I am all ready; the cattle are here, wet, wild, and muddy, and the bank awful. I couldn't help it. It would rain, and the river is on the fall. I doubt whether your men can stand on the slippery bank. My boys will take down some of the gentle ones, but Lord help you with two or three; we had to bring them in with the dogs."

"So much the better, then, that the road is wet—they will slide the easier. Ropes and men will bring them down; don't you fret, colonel."

"Well, well, I'll leave it to you; I'll risk the cattle, if you will your necks. Better wait for daylight, though—what say?"

"Never! what should I do with that surplus steam you say I carry? Wait—no; I intend to have them all aboard, and win half of them playing poker with you before morning; and at daylight I am going to take in Tom Kilgore's, at Rocky Landing. So bear a hand, boys. Stir up your lights, and rouse 'em out, one at a time, and often."

In a few minutes there was a line of men and bullocks from the top of the bank to the boat. The first dozen or two came down very orderly to the end of the gangway, where, if they hesitated, a rope was thrown over so as to encircle them behind, and two or three stout fellows at each end gave them material aid about coming on board. The owner said we should see fun directly, but not caring to participate in it personally, he took care to make himself one of the spectators, in a safe, comfortable position on board the boat. Upward of half were brought down without giving us a taste of the promised amusement, though the whole scene was exceedingly interesting.

At length they got hold of one of the animals, which the colonel said was wilder than forty deer, and vicious as an old buck in running time; and then there was fun. He was a great, long-legged, five-year-old steer, of the mouse color, long taper-horned Spanish cattle, who had never before felt the weight and strength of a man's hand upon his heretofore unrestrained wild-woods liberty. Round and round the yard he went, carrying or dragging through the mud as many negroes, sailors, and firemen as could find horn, ear, nose, or tail to hold to. Finally they got a rope round his horns and drew him up to a stake at the edge of the bank, to wait till others were caught to lead down first, thinking that he would better follow than take the front rank. He did follow. When about a dozen or fifteen head were on the way down, the wild one was cast off from his moorings and led up to the edge of the bank, when just at that moment the engineer blowed off steam, at which the frightened animal leaped forward on to the slippery path, lost his foothold, and down he went against the next, and the next, and so on; like a row of bricks, one tumbled or slid against another, upsetting men and beast, till the whole came down like an avalanche upon the end of the platform with such force that the strain upon the mooring line of the bow drew out the stake, when the strong current almost instantly swung her off shore so far, before the men could get hold of the line and make fast again, that the platform dropped off into the water, and with it eight or ten men and steers, among which was the one that caused all the mischief. I must say the fun was not so great as the fright, for a minute, as it did not take much longer to finish off the greatest feat of "sliding down hill" which I have witnessed since the halcyon days of hand-sleds and boyhood upon the snow-clad, wintry hills of my native land. That all were got out safe was owing to the instant thought and action of the mate, who sprang ashore with a pole which he placed in the wheel, so as to prevent the cattle from floating down past the stern, where it would have been impossible for them to get up the soft, slippery bank. As it was, some of them were in the water over an hour; the catamount, as the colonel called him, being purposely left until the last, and severely threatened with being towed to New Orleans. But when he was at length taken out, there was not a more docile animal in the herd; he had been completely subdued. The whole affair, though fraught with danger at first, afforded all hands a scene of most uproarious mirth. Even at the time when it looked as though half a score of men might be killed in the grand tumble, it was almost impossible to avoid laughing, the whole thing was so extremely ludicrous.

One big negro fellow, finding himself hard pressed by the bullock he was leading and half a dozen more behind him, either for sport or to save his shins, jumped upon the animal's back and came down with a surge into the water; but he never let go till he had him safe ashore again, where he met some of the most hearty, though rude congratulations of his companions, for his skillful feat of horsemanship on an ox.

Finally, in spite of mud and peril, the grand entertainment of shipping cattle on the Mississippi was concluded, and the boat was off before daylight for the next landing, where the operation was to be repeated. Owing to better ground and a different plan adopted, this was not quite so entertaining. The cattle were yarded in a long, narrow pen, which came near the shore. A rope being passed over the horns of the forward steer, with the other end through a snatch-block on the boat, a dozen or fifteen men would lay hold of it, while two men by the tail to steer, and one on each side to keep him on the gangway, would have the fellow out of the pen and sliding up the planks before he knew what he was bellowing for.

As in all cases where science and skill direct human efforts, the labor was lessened and business expedited.

And so in all cases where science and skill are exercised in regard to all kinds of domestic animals, success may be looked for.

And now, after this little incidental digression from the main intent of this chapter, in the exhibition of a life-like scene on the Mississippi, we will begin to arrange our facts in order and shape for useful reference, always aiming more at the practical than ornamental.

As we shall arrange each subject under its separate and proper head, we will begin the chapter upon domestic animals with that kind in most universal use.

SECTION II.—SWINE.

Breeding Pigs and Fatting Pork.—Next to procuring a good breed of swine—that is, a breed suitable to the purposes for which it is required—the best way to feed the stock hogs, and the cheapest and best way to fatten them, is the most important matter for a farmer to consider. No man can say, "My breed is the best of all," unless he specifies for what purpose it is best for. A good grazing breed would be best for some situations; quite the contrary for some others. The Berkshire, Essex, and Suffolk have each been denominated "the gentleman's pig," because well fitted for keeping up in close pens, one or two to a family; while a much larger breed is required by the great corn-growers of the West. And this brings us to the next most important question.

3. **Corn and Pork—How much Pork will a Bushel of Corn make?**—This is one of the most important questions that can be asked by every man who raises a bushel of corn or feeds one to a hog. Yet it is a question that not one in ten can answer. To see the ignorance of mankind upon subjects of most importance to them, makes us ready to exclaim, Does anybody know anything about anything? In conversation with many farmers, we have not yet found a man who could say how much corn it required to make a hundred pounds of pork, and consequently could not fix upon any relative price of one or the other, at which it would be profitable to feed corn to hogs. In some experiments made by Henry L. Ellsworth, at Lafayette, Ind., in warm weather, with thrifty young porkers in a pen, fed with corn in the ear, if we remember aright, he gained 12 lbs. of pork per bushel of corn. Samuel H. Clay, of Kentucky, gained 17½ lbs. per bushel, feeding the corn in the form of cooked meal. As a general thing, we should like to know if corn, fed as it usually is in the West, averages six pounds of pork to the bushel of shelled corn.

We have received several answers to this question, but they only proximately settle the point. Leroy Buckingham, of Cadiz, Cattaraugus Co. N. Y., says, a pig that weighed 52 lbs. when commenced with, fed on the spare milk from one cow and 800 lbs. of raw corn-meal, weighed 364 lbs. (live or dead not stated) when killed at seven and a half months old. He thinks each bushel of corn made about 20 lbs. of pork.

The two following letters we print entire, and commend them to the careful attention of all farmers, although they do not contain all that is necessary to be known upon the subject:

"Glenn's Falls, N. Y., *Oct.* 23, 1858.

"Sir: You think it important that farmers should *know* how much pork a barrel of corn will make. It *is* an important question, and I am sorry to say I think there are ten lawyers and mechanics to one farmer that can answer the question correctly. I once made a very accurate experiment in New York; the first day of September I weighed into the pen two hogs, a year and a half old, and three pigs, six months old. I measured old corn accurately, and had it ground. At night I wet with boiling water (to a consistency that would run freely) meal sufficient for the next day's feed. The hogs had no slops from the house—nothing but the meal and water. I killed them the first of December, deducted five cents per pound for what they weighed the first of September, and found, at six cents per pound for the pork, they had paid ninety-eight cents per bushel for the corn, which would give about sixteen and one third pounds of pork to the bushel. One year since I fatted fifteen old hogs and thirty-five pigs on India wheat and potatoes. I measured the feed accurately, steamed the potatoes, and mixed the meal in while hot, twelve hours before feeding. At five cents per pound for the pork, they paid forty-two cents per bushel for the India wheat, and fifteen cents for the potatoes. Of course the *relative* value of the wheat and potatoes is guessed at in that experiment. I "worked" the hogs in the manure business, carting in muck, weeds, etc. I got 15 cords of manure although less pork—I suppose for the working the hogs. I would like much to know if any one (especially in the Western States) has made the experiment of turning hogs into the corn-field, with free access to water, and let them help themselves.

"If any other class of business men knew as few facts in regard to their business as farmers do, they would all fail every year. New Marsh."

A. G. Perry, of Newark (State not named), weighed a thrifty pig, five months old, 150 lbs., and then fed it 56 lbs. corn-meal, mixed with hot water, thin enough to answer for victuals and drink. This was eaten in six and a half days, and the gain was 18 lbs.

A correspondent writes from North Chatham, Columbia Co., N. Y.:

"The 24th of August I put up a sow to fatten—a large proportion Suffolk—her weight, 235 lbs. Price on foot, 4 cents per pound. For food from August 24th to October 4th, gave her 309 lbs. rye bran. Rye bran is worth here \$1 12½ per 100 lbs. October 4th her weight was 295 lbs., making 60 lbs. increase from the bran. From October 4th until November 17th I fed her 10 bushels, by weight 560 lbs., of marketable corn. Killed her Nov. 17th. Her live weight, just before killing, was 413 lbs. Increase from the 10 bushels corn (or 560 lbs.), being 118 lbs. pork—it taking a fraction more than 4½ lbs. corn for 1 lb. pork—and is a fraction less than 12 lbs. pork from 1 bushel of corn, making the increase per day a little less than 2¾ lbs. The present price of corn here is 70 cents per bushel, and the pork 7 cents per pound, being barely a paying business."

J. J. Carter, of Hornville, Chester Co., Pa., says that B. P. Kirk kept a debt and credit account with his pig. He fed $49\frac{1}{10}$ bushels of corn, at 60 cents a bushel, and added the first cost of the pig, at two months old, $5, making a total of $34 46. At 17 months old the animal weighed 649 lbs., and sold for $7\frac{1}{2}$ cents a pound, making $48 67, giving a profit of $14 21. A little bran was fed, but that was reduced to the equivalent of corn, and counted as above. The breed of hogs common in Chester County is one of the best in the world. The hogs are of a white color, medium-sized, easily fatted to weigh 300 to 400 lbs. at 10 to 15 months old, and have small bones, fine-grained flesh, large hams, well marbled, and large leaves of kidney fat. It is a distinct American breed, and one of the best for farmers who desire to graze their hogs in part, and then fatten them easily upon house-slops, apples, potatoes, and coarse grain. Even for large farmers, and for making pork upon a large scale, there are not many, if any, breeds of swine in this country superior to that known as Westchester, or Chester County (Pa.) hogs. And as I consider it an important fact that farmers should know where to get a real good breed without paying fancy prices, I am glad of the opportunity to make this breed better known.

D. C. Nye, of Lexington, Mass., in reply to an inquirer in the *Genesee Farmer*, writes that—

"The Chester County hogs are distinguished for their early maturity, great facility for fattening, and are very quiet and docile. They are well covered with bristles, and, unlike the Suffolks, can endure the heat and cold. The Chesters will probably make as much pork (and of a superior quality) on a given amount of food as any other breed—some of them, when well fed, having attained the weight of six or seven hundred pounds."

Another correspondent of the same paper says, in addition, that the thorough-bred Chester hogs are always white, and that "they are peculiar in being fit for slaughtering at any time."

But to proceed with the subject of feeding hogs. The second letter is very much to the point. It says:

"In answer to your question, 'How much pork will a bushel of corn make?' I send you the result of two experiments, made some years ago, while occupying a farm in the northern part of Chester County, Pa.

"My first experiment was with five very ordinary pigs that I bought of a neighbor; weighed, October, 1851, 249 lbs; fed on corn and cob meal, boiled into mush, of which they consumed in 30 days 279 lbs., and gained 87 lbs. live weight.

"In the next 32 days they consumed $375\frac{1}{2}$ lbs., and gained 75 lbs. live weight, making a gain of 157 lbs. in 62 days, having consumed $654\frac{1}{2}$ lbs. of corn and cob meal, which is equal to about $9\frac{1}{3}$ bushels pure meal; or one bushel pure meal cooked made 16.8 lbs. live weight.

"My second experiment was with a lot of five very superior pigs, of the Chester breed; they weighed, Feb. 7, 1853, 695 lbs; consumed in 9 days

252 lbs. corn and cob meal, scalded, and gained 78 lbs. In the next 9 days they consumed 125 lbs. whole corn, boiled, and 128 lbs. of corn-cob meal, scalded, and gained 57 lbs.

"In the next 9 days they consumed 278 lbs. corn-cob meal, scalded, and gained 70 lbs., making a gain in 27 days of 205 lbs. on a consumption of 658 lbs. corn-cob meal, and 125 lbs. whole corn. Assuming that 70 lbs. of the cob-meal contains 56 lbs., or one bushel pure meal, we have $9\frac{2}{5}$ bushels of pure meal and $2\frac{1}{4}$ bushels whole corn, making a consumption of $11\frac{3}{4}$ bushels nearly, and a gain of 205 lbs. flesh; or 56 lbs. of pure meal, scalded, made 17.44 lbs. of live weight.

"The above surprising gain for food consumed was the result of very careful feeding, clean and warm bedding, and a tight house.

"RICHARD THATCHER, Darby, Pa."

Thomas Hoag, of Somhanock, N. Y., has sent us a detailed statement of the feeding of ten pigs, out of a litter of twelve from a native-breed yearling sow, taken from her at seven weeks old, and fed till slaughtered, at forty weeks old, with the following substances, with estimates of expense added:

$212\frac{1}{2}$ bushels of corn, at 75 cents	$159 38	Pasture	$3 00
63 bushels of oats, at 45 cents	28 35	Wood used in boiling food	2 00
Paid for grinding	14 79	Extras	2 00
13 bushels of small potatoes, $12\frac{1}{2}$ cents	1 63	Value of pigs at seven weeks old	30 00
6 loads of pumpkins, at $1	6 00		
203 lbs. of carrots	1 00	Total	$248 15

These hogs weighed, dressed, 4,066 pounds, and sold,

(in 1853), at Lansingburg, N. Y., at $7 50 per cwt	$304 95
Rough fat, 175 lbs	17 50
Total	$322 45
Total cost	248 15
Balance	$74 30

This is the amount of profit, or, rather, pay for labor, and the spare milk of four ordinary cows fed to them, and not estimated as above.

At six cents a pound the result would have been

4,066 lbs., at 6 cents	$243 96
Rough fat	17 50
Total	$261 46
Cost	248 15
Profit	$13 31

This certainly does not give a very flattering picture of the probable profits of pork-making in this section of the country, where every kind of feed is salable at high prices.

Other letters were subsequently received, from one of which we gather the following information: Wm. Renick, of Circleville, Ohio, a large farmer, and long engaged in the raising of cattle and hogs, writes more extensively than we can find room for. Mr. Renick thinks that farmers are not ignorant of the fact "how much pork will a bushel of corn make," and says:

"Probably nine tenths of our best practical farmers could, without hesitation, give you an approximate answer in general terms."

This is exactly what we supposed, and that they would give nothing but an approximate answer in general terms, because there is a general lack of positive information upon this and many other important matters connected with the farming interest. Mr. Renick gives the gain upon five hogs fed by himself in the common rough method of the West—that is, turned into the corn-field, 200 head together. Three of these hogs weighed, at seven months old, 140 lbs. each, and two older ones weighed 125 lbs. each. After feeding 120 days, the three weighed 286 lbs. net average, and the two 185 lbs.

"Now, say that hogs on an average will eat 20 bushels of corn per hundred head per day for the first 60 days, 16 bushels for the next 30 days, and 12 bushels per hundred head per day for the last 30 days, and we have 21 bushels per head for the whole time of 120 days (though this is under rather than over the mark), and we have a production in the case of the three hogs of $10\frac{1}{3}$ lbs. of gross pork for a bushel of corn, and but a small fraction over 5 lbs. per bushel for the two hogs."

Now, this is exactly in proof of what we originally stated. It is all guesswork. Mr. Renick further says:

"The large feeders of hogs and cattle are oftentimes greatly mistaken in their calculations in regard to the quantity of stock their corn will feed, sometimes largely overrunning, and again falling largely short of their calculations."

This is not to be wondered at, when it is considered that no one pretends to have any settled rule of action, but buys as many lean cattle or hogs as he guesses he can fatten. Mr. Renick thinks the most common answer to the question would be something like this:

"That hogs fed in the ordinary way will gain from one pound to one and a half pounds per day, and they will consume some twenty bushels or more of corn in three and a half or four months; that it all depends upon the quality of the hogs, quality of the corn, weather, and other contingencies."

The gain varies from five to twelve pounds gross per bushel. So he says: "We will compromise the matter by *guessing* that, all things favorable, one bushel of corn, fed in the ordinary way, will make seven pounds gross weight." It is, after all, then, nothing but guessing. And we guess that feeding corn, where it is worth a dollar a bushel, as it frequently is in and about New York, won't pay while dressed hogs are sold from the hooks, as they generally are, at seven or eight cents a pound, and the average price of live hogs is less than six cents a pound. With our arithmetic we can not figure up any profit for a farmer hereabouts to keep a single hog more than he wants to eat up the milk and house-slops, and a little waste grain; and probably that could be more profitably fed to poultry.

The greatest advantage from feeding grain to make pork in all the New England States must be looked for more in the manure than in the meat. Where manure must be purchased, it may be profitable to purchase corn-meal to convert into manure through the pig-pen manufactory. The next paragraph is to the point in this connection, of feeding pigs to make manure.

4. **Working Pigs.**—We once recommended farmers to make their pigs working animals. To this a writer in an agricultural paper objected; because, as he alleges, the same amount of food consumed by an idle hog will make 12 pounds of pork as easily as it will make 8 pounds if the animal is allowed to exercise his natural propensity to root. In this we entirely agree, and have often contended that when a hog is shut up to fatten, if he was confined in a slip so narrow that he could not turn round, having one side of his narrow prison made so as to be moved out as he increased in bulk, he would fatten faster than in any other position. Now, will the writer, who thinks that we differ from him in opinion, read over again the article that he criticises, and see that it is the pig-pen, and not the fatting-hog pen, that we were talking about. Our facts are not intended to be elaborated into proofs and arguments for farmers, but rather as texts for thinking men to think over and reason upon with themselves and neighbors. Our opinion is, that all the swine family should be kept imprisoned, if not in close pens, certainly in strongly fenced lots; and in all the Eastern States, where manure is so valuable, it is very doubtful whether a farmer can afford to let any of the family out of the pen—which, as we before hinted, should be a great manure manufactory—except, perhaps, for a short season to eat clover, peas, or glean a stubble-field. If there is a greater neighborhood nuisance than hogs in the highway, we have yet to find it out; and as we would always keep "Mr. Pig" in the pen, we recommended to make him work in the manufactory, furnishing a part of the materials to be worked, and the farmer the remainder. In his immediate preparation for death we don't care how idly he spends the last of his days. As long as farmers will persist in making the flesh of swine their leading article of food, we shall contend that the flesh of an animal that has worked his way up to a mature age, and is then fattened ready for slaughter, will make more healthy food than the oily fatness of one always kept in a state of obesity and idleness from his birth to death. It is this great physiological fact that causes the flesh of the wild hog to be sought after and eaten with gusto. We fully agree with the orthodoxy of E. M. Brewster, a model farmer of Griswold, Conn., who says if he was to fatten a half-dozen hogs upon a flat rock, he would be sure to have two rings in each nose. The latitude that we desire our readers to give to our suggestions is just this: to make a distinction between working and fattening animals, and make the pig a useful one.

"Keeping pigs eighteen months to fatten them the last three is not a paying business. Feed a decent pig *well* from weaning until eight months old, and you will get 250 lbs. to 300 lbs. of pork, and you do not usually get 50 lbs. more for those ten months older. There can be no question but an animal can *consume* much more to produce in eighteen months about the same quantity of meat which is made by another in half that length of feeding. If the object of raising a hog is to *make pork*, that end should be kept steadily in view—his swineship should see it, and *eat* for it." This is our view exactly. Winter none but autumn pigs, keep them in pens, and always growing. "To keep a pig growing, one must keep him eating, and eating about all the time. To do this, there is nothing like 'change and variety'— now a little corn, then a little milk, a few boiled potatoes, a few raw apples—now a pudding, then a dish of greens—anything to keep them eating and stuffing when awake, even if it does require a little extra attention."

5. **Cooking Food for Swine.**—Circumstances must govern the feeder. If corn is worth but twenty-five cents per bushel, it is plain that it will not pay to expend much money either for cooking or crushing it; but where food is high, a small quantity saved pays for considerable labor, etc. It will hardly pay to expend dear labor upon cooking cheap roots to make low-priced pork. It has been proved that crushed barley, soaked in cold water 46 hours, gave more increase of weight to sheep than when not soaked; but crushed malt did not. The figures are: Four sheep in 10 weeks ate 280 lbs. of crushed barley *not steeped*, and 3,867 lbs. of mangel-wurzel, and increased in live weight 81 lbs.; while four sheep, with barley crushed and *steeped*, ate 280 lbs. and 5,321 lbs. mangel-wurzel, increasing 101½ lbs. Four sheep, with crushed malt, *not steeped*, ate in 10 weeks 227½ lbs., and 3,755 lbs. mangel-wurzel, and increased 84 lbs.; while four sheep, with malt crushed and *steeped*, ate 226½ lbs. malt and 4,458 lbs. mangel-wurzel, and gained only 78 lbs. In the above experiment, the question is, Did the additional 20½ lbs. pay the extra trouble and extra feed of roots?

An experiment in Ireland, lately made, proves that hogs gained more upon raw than cooked vegetables. Eight hogs were selected and divided into two lots, as evenly as could be, and put in to fatten, on the 27th of November. Each lot was fed regularly three times a day, having each 12 lbs. of bran and barley meal, the only difference being that one lot had steamed ruta bagas, and the other pulped or rasped ruta bagas. The experiment was continued 39 days; the lot having *cooked* food ate 468 lbs. bran, etc., and 10,920 lbs. ruta bagas, and increased 103 lbs.; while the lot having *uncooked* food ate 468 lbs. bran, etc., and only 5,460 lbs. ruta bagas, and gained 110 lbs.

Samuel H. Clay, of Bourbon, Ky., has been experimenting in feeding several lots of hogs, changing them from raw to cooked, and from ground to unground food, with the following results: One bushel of dry corn made 5 lbs. 10 oz. of live pork; one bushel of boiled corn made 14 lbs. 7 oz. of pork; one bushel of ground corn, boiled, made in one instance 16 lbs. 7 oz., in another nearly 18 lbs. of pork. To get the value of corn, estimate the pork at 8 cents a pound; we have as the result of one bushel of dry corn, 45 cents' worth of pork; of one bushel of boiled corn, 115 cents' worth of pork; and of one bushel of ground corn, 136 cents' worth of pork.

6. **Pig Feed—Boiled Weeds.**—A widow, who was short of feed for her pig, said, in presence of her little boys, that she thought she would have to sell

it, for she had so little to feed it with, and could not afford to buy feed. One of the little fellows promptly answered that he knew what would be good to feed piggy with, and of which they had plenty.

"What is it, my son?"

"Greens, mother—boiled greens. They are good for us, why not for pigs? And we can gather them, and pick up wood and boil them in the big kettle out doors, and it will be real fun."

So it was settled that pig should eat greens—all sorts of weeds boiled; and eat them he did, and liked them, and fatted on them, with the small addition that could be made of bran and house-slops, mixing the slops and greens together.

This is a hint worth remembering and acting upon. The weeds were destroyed, the boys employed, the pig kept growing, and the boys had the satisfaction of feeling that they had been usefully employed.

7. **Hog Pastures.**—It being generally understood that hogs live by "special providences" until it is time to fat them, there is little attention paid to the most economical way of growing them up. Certain it is that a good, easy-keeping variety will make commendable progress on *grass*.

It may be safe to calculate that a good-sized, thrifty pig will gain in six months, on grass, 100 lbs. or more. If an acre of grass would keep three hogs and add 100 lbs. to the weight of each, that would be $12 for the acre of pasture, reckoning the 300 lbs. gain at four cents a pound, live weight. Instead of being forced to bite twice at a short, dirty, dried, and battered spear of June grass by the roadside before getting any off, imagine a clean and comely Suffolk in a fresh, green pasture of clover, four inches high, filling himself with evident relish.

8. **The Pig-Pen and its Value.**—As a manure-maker, there is no animal equal to the hog, provided he is furnished with suitable facilities. The eating and sleeping apartments of Mr. Pig should always be a good frame building, with a plank floor and shingle roof, and it will in many places be found economical to give him an iron eating trough. His house should be cleaned out every day, and washed as often as necessary to keep it clean. All the washings and cleanings should go into an adjoining pen, which may as well be made of fence rails, on account of cheapness and convenience of removal, into which the tenants of the hog-house must be invited by a little corn, scattered in every day, to induce them to mix up a compost of their own offal with sods, mold, leaves, weeds, and all sorts of trash. This pen should be equal to ten feet square for every two hogs, and so long as it is worked every day it will not much injure by exposure to the weather; but it should afterward be covered, and it should always have stuff enough put in it to keep the hogs from getting into a very muddy condition. If you have not mold enough to entirely absorb the ammonia, you must use plaster or charcoal dust. It must be kept sweet, or you will lose much of its value; and where manure is valuable, if you neglect to use your swine for the purpose of increasing it, you will lose about all the profit of making your

own pork. There is another way in which you can make the pig-pen valuable. If you have a spot of ground that you want to enrich and work deeply and thoroughly for fruit-trees or for garden vegetables, plant it with Jerusalem artichokes, and then yard your hogs upon it, taking care to give them room enough, so as not to necessitate them to make a quagmire. Again, you may use these animals to advantage if you have a piece of grass land infested with grubs. Fence off a piece, and shut your swine in upon it for a few days without feed, and if they leave a sod unturned or grub uneaten it will be a wonder. It is the best preparation of such a spot for a hoed crop, or for sowing again in grass, that can be given. There is no good reason why the pig should be always kept in idleness or mischief. Let him be trained to be useful in his life as well as at his death.

9. **Hay Seed for Hogs.**—A correspondent of the *Country Gentleman* writes: In addition to the grain and meal given to growing hogs in the sty, they should have a daily allowance of green clover, or in winter, when this is not available, a liberal allowance of hay-seed from the barn, mixed with their slop, which they will eat with avidity. He knows of no mode by which so great an amount of growth and weight can be induced, with equal cost of food, in the winter season, as by this haying system.

10. **Cinders for Pigs.**—J. J. Mechi, of Tiptree Hall, England, says, in publishing his experience in fattening swine, that among other things, he has learned the fact "that pigs are very fond of coal-ashes or cinders, and that you can hardly fat pigs properly on boarded floors without giving them a moderate supply daily, or occasionally." He says: "In the absence of coal-ashes, burned clay or brick-dust is a good substitute. If you do not supply ashes, they will gnaw or eat the brick walls of their sheds. I leave to science to explain the cause of this want. It is notorious that coal-dealers, whose pigs have access to the coals, are generally successful pig feeders. Those who find that their pigs, when shut up, do not progress favorably, will do well to try this plan. A neighbor of mine found that a score of fat pigs consume quite a basket of burned clay ashes daily. We know that there is an abundance of alkali in ashes."

11. **Parched Corn and Honey for Hogs.**—A correspondent of the *Highland Democrat*, published at Peekskill, N. Y., furnishes that paper with the following communication:

A few years ago I chanced in Albany to meet a farmer who is noted for raising unusually heavy hogs. The year before he had brought to market one that weighed over 700 lbs., and said that year that he should have one of 900 lbs., or near that mark. As there always seems to be a cause for every effect, I was anxious to know the course he pursued.

"Well," said he, "you must first select the right kind of a critter. Get the right breed, and then pick out the good-natured ones from the litter; I can't afford to feed a cross critter; I sell them when they are pigs." "How can you judge?" said I. "Well, if you watch them when they are feeding, you will find that some pigs are allers fighting about their victuals, and some go in for eating. There is as much difference in pigs as there is in folks."

"Well, when you have selected the right kind of a pig, what next is important?"

"Well, then you must have a nice place for the critters to live in, and feed them on the right kind of victuals."

"What kind of food?"

"Well, the best and cheapest kind of food I have found, when it comes time to put on the fat, is *parched corn.* I generally manage to buy a barrel or two of Southern honey, if it is cheap, which I mix with the parched corn, for my fatting hogs."

12. **Feeding Standing Corn to Hogs—in the Field—or Gathered, Ground, and Cooked—Comparative Advantages of these Methods.**—The method often practiced by large farmers of turning fattening hogs into the fields of standing corn, if properly conducted, has its advantages over that of gathering the corn and feeding it dry to the hogs in the pen.

The earlier in the season the process of fattening swine is begun the better, after the grain has reached a certain period of maturity, whether it be rye, oats, or corn, because all farm animals, and hogs in particular, will fatten much faster in warm than in cold weather. And the grain between the periods of its doughy state and full maturity, or rather, before it becomes dry, is more easily digested, and assimilated, and converted into flesh and fat than when it has passed into its dry state. It is clear, then, that the sooner the hogs are turned into the field after the grains of corn are fully formed, and while yet in the milk, the more speedily they will fatten; for if the weather be dry, the corn hardens very rapidly.

A very interesting experiment in feeding hogs is detailed by Mr. James Buckingham in the *Prairie Farmer.* On the 6th day of September (in ordinary seasons corn, at this date, is too far advanced to commence feeding to the best advantage), the hogs, 189 in number, were weighed, and footed up in the aggregate 19,600 lbs. A movable fence was used, confining the hogs to an area sufficient to afford feed for two or three days. The entire field, thus fed, contained 40 acres, with an estimated average of 40 bushels per acre. The consumption of this corn gave a gain of 10,740 lbs. The hogs, when turned into the corn, cost three cents per pound, equal to $588; worth, when fed, four cents per pound, or $1,213 60—giving a return for each acre of corn consumed of $15 64. Adding to this $1 per acre for the improvement of the land by feeding the corn on the field, making the actual gain per acre $16 64, equal to 40 cents per bushel, standing in the field. The whole cost of corn per acre, exclusive of interest on the land, is set down at $3 65.

By way of comparing the advantages of ground and cooked food over that which was merely ground, and that which was unground, Mr. B. put up three hogs into separate pens. To one he fed two and a half bushels of corn in the ear, during a period of nine days, feeding all he would eat; this

PLATE III.

(Page 31.)

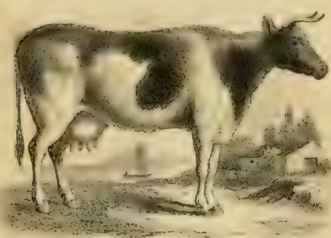
This plate is intended to answer the question: "What is a good cow?" It shows a model cow, without regard to breed, as described in ¶ 45, and a portrait of the "Oaks Cow," which was one of the most remarkable of the early age of stock improvement as a great butter producer. She gave 467 pounds from May 15 to December 20, 1816. Another portrait gives the side view of what is taken as a model of a good dairy cow. The Dutch dairy cow is also considered a model, not only of that breed, but of a form that shows a good cow for milk. The Hereford cow and bull, and Devon cow and bull, also give good studies, and make up a picture no where else to be found in such compact form and such beauty of execution.

Hereford Cow.

Hereford Bull

Devon Cow.

Devon Bull



Dutch Dairy Cow

Oakes Cow

A Good Dairy Cow.

A Good Milch Cow

DIFFERENT BREEDS OF CATTLE IN THE UNITED STATES gave a gain of 19 lbs.; another ate in the same time one and three quarter bushels of corn, *ground*, and gained also 19 lbs.; and to the third he fed one bushel of corn, *ground and boiled*, which gave a gain of 22 lbs. By this it will be seen that one and three quarter bushels of corn, when ground, will give a gain of flesh equal to two and a half bushels of unground corn, and that one bushel, when *ground and cooked*, gave a gain greater than either.

The comparative results of these three methods of feeding may thus be set down: one bushel of corn, ground and cooked, is equal to nearly three bushels when fed dry and unground; and one and three quarter bushels when ground and uncooked is equal to two and a half bushels when fed whole.

Or it may be stated thus: one bushel of dry corn in the ear makes $8\frac{1}{4}$ lbs. of pork, which at four cents per pound is equal to 33 cents per bushel for the corn; while one bushel of corn, ground and boiled, makes 22 lbs. of pork at four cents per pound, and is equal to 88 cents per bushel for the corn. This result about sustains our calculations made upon the experiments by Mr. Samuel H. Clay, of Kentucky, as appears in ¶ 5.

It is worthy of remark for those who wish to feed corn in the field, that had the hogs been turned into the field when the corn was in the milk, it would have given a result more nearly like that of the hog fed upon ground and cooked food.

The obstacles which seem to be in the way of adopting an improved method of fattening hogs result from the imperfect apparatus used for preparing the food. Sending corn a long distance to mill to be ground, and then to cook the meal in an ordinary kettle, even if it holds a barrel, will prove an expensive operation, as all have found who have undertaken it. But to realize the full advantages of feeding prepared food, a complete grinding and steaming apparatus must be erected on a large scale, with the view to perform the grinding, cooking, and feeding with the greatest facility and at the least possible cost. This may be done to advantage by employing steam for grinding, using the same boiler to furnish steam for cooking the meal.

13. **Origin of the Chester County Hogs.**—It is stated that Captain James Jefferis, a sea-captain, somewhere about 1820, or a little later, in one of his voyages from England, brought over a pair of pigs of the Bedfordshire breed, which he sent to his farm on the Brandywine, whence the breed has been disseminated, and lost its original name. Some of the characteristics of the Chester County hog are, large size, remarkably symmetrical form, easy keeping, comparatively little offal, great depth and length of carcass, and producing large quantities of lard. Spring pigs are often put in market at nine or ten months old, and weighing at that age from 200 to 250 lbs. This weight is of course produced by good feeding and proper attention.

14. **To prevent Sows Killing their Pigs.**—A correspondent of the *Maine Farmer* speaks of several cases of sows destroying their pigs—which, indeed, is not unusual—and commends as an easy and sure prevention, "to give

the sow about half a pint of good rum or gin, which soon produces intoxication, and the drunken mother becomes entirely harmless toward her young, and will ever accommodate her position to the best advantage of the pigs, retaining this disposition ever afterward." The editor confirms this statement from cases within his own knowledge.

15. **Pig-Breeding.**—Notwithstanding the fact that more people are interested in the breeding of pigs than of any other class of domestic animals, the attention paid to improvement of the stock is very small. How few farmers know that the sow should always be larger than the male, and that he should always be of the most perfect form, of good color, and perfectly sound and healthy, because almost invariably the pigs take the qualities of the sire instead of the mother; that is, his good or bad points will preponderate largely over those of the sow. Farmers, please think of this fact, and profit by it.

16. **Large Hogs.**—Isaac Harrison, of Burlington County, N. J., fatted, in 1858, 32 hogs that averaged 569 lbs. each; and William Taylor, of Ocean County, fatted 30 that averaged 537 lbs. each. Thomas Hood, of Ocean County, fatted 41 that averaged 533 lbs. each. So says C. W. Hartshorn, of Burlington County, who sends us a list of weights, among which are very few under 500 lbs.; the lightest that we notice weighs 428 lbs.

17. **Gross and Net Weight of Swine.**—The rule of ascertaining the net weight of fat hogs is to deduct one fifth of the gross weight. It is an easy way to make the calculation, or reduction of gross to net weight, by using the decimal 8-10 as a multiplier, cutting off one right-hand figure of the product, to show the net sum. Thus: 10 hogs weigh 2,729 lbs.; multiply by .8, which will make net 2,183.2 lbs.

If you have the gross weight of a drove of hogs at home, which you may have taken to market and sold at net weight, and wish to ascertain how the net and gross compare, take your sum of the net weight, say 2,183.2. Divide by 8-10, and you will find the quotient 2,729.

This will be found a very convenient and useful rule. Sometimes a person may be offered one sum as a gross price, and another as a net price of the same lot, and would like to know at once which offer is the best. This is quickly done. You have simply to apply the same rule of division by eight tenths to the price, instead of weight. For instance suppose the offer is—as it sometimes is in New York—$5 25 per cwt. gross, or $6 50 net. Divide $5 25 by 8-10, the quotient will be $6 56.2, showing that it will be six cents and two mills per cwt. gross to the owner's advantage to sell at $5 25 gross.

18. **Salting Meat Warm.**—C. Bovie, of Gullprairie, Michigan, asks: "Will pork cure, if packed before the animal heat is all out of it?" He then answers: "Last year I killed my hogs and packed them while warm. I have some of the pork now, and I never ate any sweeter pork than this is. The most of farmers think pork salted, while warm, will not keep."

We have tried the experiment repeatedly of salting pork as soon as we could cut it up after dressing, and certainly prefer it, as it will, when dry-salted, cure much quicker.

19. **Species of Animals.**—The *Revue Horticole*, of Paris, gives a very interesting account of a discussion in the *Academie* upon the species of animals. The primitive source of animals is lost; the fossil bones of the horse are identical with those of the present day. There is no account of anything new in animal life since the Mosaic account of creation.

20. **Animal Structure.**—" The bony frame-work of the animal owes its solidity to *phosphate of lime*, and this substance must be furnished by the food. A perfect food must supply the animal with these three classes of bodies, and in proper proportions. What proportions are the proper ones we have at present no means of knowing with accuracy. The ordinary kinds of food for cattle contain a large quantity of vegetable fiber or woody matter, which is more or less indigestible, but which is indispensable to the welfare of herbaceous animals, as their digestive organs are adapted to a bulky and rough food. The addition of a small quantity of feed rich in oil and albuminous substances to the ordinary kinds of food, has been found highly advantageous in practice. Neither hay alone, nor concentrated food alone, gives the best result. A certain combination of the two presents the most advantages."

The above is the view of an eminent professor of agricultural chemistry (S. W. Johnson), and it contains a great fact that should be adopted into the every-day practice of every farmer, and not only for his stock, but his own household. Every animal of a higher organization than a worm needs a diversity of food to make up a healthy animal structure.

SECTION III.—COWS.

WHAT is a Good Cow?—This is a question that many owners of cows can not answer, because there is no standard. Every one has his own, and one person may recommend a cow on sale as positively good, that is not half as valuable as one that comes only up to the standard of another person's idea of goodness. Besides, one cow may be good for producing milk for sale by the quart; another good for making butter, where that alone is the object; a third one may be good for a cheese dairy and very poor for butter; and a fourth not good for either purpose, and should at once be turned out for beef. Farmers do not experiment enough with their cows to ascertain these facts. We have known one cow discarded from a butter dairy because she gave less milk than another, when one was to be sold, without any other proof that the rejected one was not equally good. For butter-making, we think a cow which gives 14 quarts of milk a day, when fresh, and 14 lbs. of butter a week, a good cow, and that that might be adopted into use as the meaning of a good butter-dairy cow. A good many cows, it is true, go above that, but they should be ranked as extra good. A cow that gives 12 or 14 quarts of milk a day, and 10 lbs. of butter a week, might be called a fair medium cow; and one that gives 8 to 12 quarts a day and 6 or 7 lbs. of butter a week, should be called common, and all below that inferior, as in fact they are; and so is a cow that gives 15 or 16 quarts of milk a day that yields only a pound of butter, and there are many of this description. The lowest rate we ever heard was 3 quarts of milk for 1 lb. of butter; but that is very rare, the average being over 12 quarts.

It would be an excellent plan for some leading agricultural society to establish a standard for a good cow. We think a cow that comes up to the standard of that owned by Otis Hunt, of Eaton Village, N. Y., will pass for a good one. He gives the following statement of the amount of butter made from her: "Amount made from April 8 to July 8, 191 lbs.; amount made during the month of June, 74 lbs.; amount made during the year, 516 lbs., besides furnishing all the milk and cream used in a family of four persons (and occasional visitors) all the time."

The breed of this good cow is given as "native," and the quality of milk and butter excellent.

22. **Garget in Cows.**—A letter from Fort Independence, Castle Island, Boston Harbor, Mass., says:

"Within the last two years I have purchased at different times three cows, say about one every six months. After they are on the island a few months they become 'gargety;' therefore I should think the complaint is brought on from eating some weed peculiar to this island, which is limited in extent, say about thirty acres."

No, sir; it is because they have not eaten some weed—a weed called poke or scoke, producing the "scoke-berries" that robins and school-children are both fond of gathering in the fall. This scoke is the natural cure for garget. It is said that the disease never affects cows that run in pastures where it grows. We have known the dried roots sell for $2 a lb. in Vermont to feed cows, and to make little plugs to insert in the teats to cure the garget. It is there known by the name of garget root. (*phytolacca decandra*).

23. **How to Increase the Value of a Cow.**—Every one who owns a cow can see at a glance that it would be profitable to increase the value of her, but every one can not see how to do it. We can, and we think that we can make it equally palpable to our readers. If a cow is kept for butter, it certainly would add to her value if the butter-making properties of her milk should be improved. In summer or winter this can be done, just as the yield of a cultivated crop can be improved by what is fed to each, and it is simply a question of, will it pay, in manuring one or feeding the other. Indian corn will add to the quantity and quality of the butter to a very sensible degree,

and it is simply a question of easy solution, by experiment, whether it will add to the profit of the butter-maker to buy corn at one or two cents a pound, and convert a portion of it into butter at 25 cents a pound, or whatever the market price of corn and butter may be, and another portion of it into fat, and another portion of it into manure, for that is the natural result of the chemical change produced in the laboratory of the cow's stomach. The same result will follow any other kind of feeding. Good pasture will produce an abundance of milk, often as much as the cow can carry; but does it follow that even then it will not be profitable to feed her with some more oleaginous food to increase the quantity of butter, just as it sometimes proves profitable to feed bees, to enable them to store more honey? It certainly does appear to us that the value of a cow feeding upon ordinary winter food may be almost doubled by making that food suitable for the purpose of increasing the quantity of milk, if that is the object, or the quantity of butter, if that is the purpose for which the cow is kept. Farmers generally understand that they can convert corn into beef, pork, and lard, and some of them know exactly at what price per bushel it will pay to convert it into these substances; but does any one know at what rate it will pay to convert corn or any other grain into butter, or any other kind of feed into any of the dairy products? Is the whole business a hap-hazard one? We fear so. Some persons know that they can increase the salable value of butter by adding the coloring matter of carrots to it. Does any person know the value of a bushel of carrots fed to a cow to increase her value as a butter-producing laboratory? Experimental proof upon this point would be far more worthy of agricultural prizes than it is to see who can show the largest-sized roots; for by a few carefully-conducted experiments we should be able to increase the value of a cow almost at pleasure.

24. **Pasture—How many Cows to an Acre.**—In Cheshire, England, which is a great grazing county, the land that has been under-drained and top-dressed with ground bones, will carry one cow to each acre through the summer, but the land not thus treated will only carry one cow to two acres. The dressing of bones upon pasture land is 12 to 15 cwt. per acre once in seven years. But even if not repeated at that time, it still continues better than it was before the bones were applied.

Now, how many acres of pasture, on the average, does it require in this country to the cow? Would it not be economy to improve our pasture lands up to the Cheshire standard?

25. **Food Consumed by a Cow.**—It is generally estimated that a cow needs each day three per cent. of her weight in hay. That is, if she weighs 8 cwt., which a fair-sized cow will do, in working order, she will require 24 lbs., or its equivalent, of hay. For five months' feeding—150 days—you will require 3,600 lbs. In the New England States the feeding period averages nearer six than five months, and therefore two tuns of hay should be allowed for each cow.

26. **Feed, Exercise, and Shelter** have a powerful influence upon the health

and comfort of all domestic animals, and upon none is it more marked than upon the most valuable of all, the cow. Every judicious farmer, who has an eye only to his purse, will see that his cows are bountifully supplied with proper food to produce the largest flow of milk, and rich in cream, and that his meadows and pastures are free from noxious weeds, that will impart a disagreeable taste to the milk and butter. A mixture of timothy and white clover is the most desirable pasture for the dairy; and the best and sweetest butter is generally produced in May and June; for then kind Nature sends up a spontaneous supply of rich, juicy food, and the air is cool and pure, and all things combine to render the dairyman's task easy and delightful. But when the sun has scorched the vegetation and impaired its nutritive properties, and the temperature of the atmosphere is like an oven, then there is *need of skill* to counteract the opposing influences of nature; and the task, though difficult, can be accomplished, and a cool atmosphere created in the milk-room, and proper food supplied, as the reward of well-directed labor.

Every farmer should practice, at least on a small scale, growing extra feed for his cows, when pasture fails. One of the easiest things grown for fall feed is cabbage. It gives an immense amount of food per acre.

27. **Feeding Cows for Butter-Making.**—A writer in the *Farmer and Gardener* (Phila.) says: "The use of corn and cob-meal in my practice has produced more fat than butter. The best feed I have tried is two bushels of ship-stuff to one bushel of ground corn. In the use of corn fodder, I have found great advantage in not only cutting, but steaming it. Many cows will not eat it without its being steamed. Turnips are good enough, if the taste they impart to the butter is not objectionable. Pumpkins add largely to the quantity of milk, but the cream, in churning, is always frothy, and requires a longer time to be converted into butter.

"My plan of feeding is as follows: I always let my cows go dry about the first of the new year, giving them, by this plan, a rest of some two months. During this period of rest I feed them on hay, corn-fodder, and straw. As soon as they begin to spring, I add four quarts of meal to each cow, which, after being mixed with the long straw and fodder, is steamed, and fed a *little warm.* Until the calves are separated from the cows, this amount of food is given once a day, after which time I feed them three times a day."

28. **Health of Cows.**—A sickly cow not only yields a diminished profit, but she yields sickly milk, and sickly in a higher degree than her flesh.

If a cow eats anything that has a strong or disagreeable odor, it appears in her milk.

If she eats anything medicinal, it comes out in her milk.

If she is feverish, her milk shows it.

If she has sores about her, pus may be found in her milk.

If she is fed upon decayed or diseased food, her milk, since it is derived from her food, will be unhealthy. It is as impossible to make good milk from bad food, as to make a good building from rotten timber.

If there is anything wrong about her, it will appear in the milk, as that is an effective source of casting it from her organism.

These facts should at all times be well impressed upon the minds of dairymen, but more especially in the cold season of the year. Closely confined in their narrow stalls through the long winter, where the air is not always fresh and pure, nor water and exercise always had when desired, nor their food always free from foul medicinal weeds, as thistles, daisies, white top, etc., cows are very likely to vary from a perfectly healthy condition; spring cheese will be faulty enough, do the best we can—that every dairyman knows. The health of the cows should not, at any rate, be allowed to become a cause of deterioration. Green food should now, if it has not been before, alternated as often as possible with the dry; for this purpose, beets, carrots, turnips, potatoes, cabbages, parsneps, and apples are valuable.

Ventilation and watering should be promptly attended to, and salt and meal, made by pulverizing burned bones, should be kept where daily access can be had to them, if desired, nor should their strength and flesh be allowed to fail for the want of a sufficiently nutritious diet. The best flavored butter and cheese can not be made from cows that are badly fed, or ailing, or poor.

As bad health in parents transmits a tendency to disease in the offspring, it is important that every kind of animal we desire to continue on our farms should be kept vigorous and healthy.

As an unhealthy animal can not consume food to as good advantage as a well one, it is again economical to avoid disease.

29. **The Amount of Hay required for Cows—The Cost of Milk.**—Otis Brigham, of Westborough, Mass., after seventy years' experience in farming, says, in the *New England Farmer*, that good cows will eat, on an average, 20 lbs. of hay per day when giving milk, and 15 lbs. when dry—not by guess-work, but tested by actual weighing, for months at a time. Then it is easy to calculate the cost of milk. In the neighborhood of New York, the average value of hay is one cent a pound, and the quantity of milk not over six quarts. At three and a half cents a quart, it will pay the hay bill, and one cent a day over. If other feed is given, the increase of milk must pay for that. The manure will be worth at least the cost of attendance and milking. If the milk is worth more than three and a half cents, it gives a profit; and if less, a loss.

30. **For Kicking Cows.**—Take a short strap, and fasten the ends together. Next prepare a pin of some soft wood, about six or eight inches long, one and a half inches in diameter. Take the cow by the off fore-leg, and double it at the knee-joint close; pass the strap or loop over the knee, pressing it back until you can insert the pin between that and the knee-joint, and she can not kick.

31. **Directions for Spaying Cows.**—Dr. Dadd, veterinary surgeon, in the *American Stock Journal*, says that the milk of spayed cows gives more cream than ordinary milk, and that the butter made from it is more delicious in taste. The milk is also invaluable for nursing infants. He thinks there is

no danger in performing the operation, if skillfully done, and the animal put under the influence of sulphuric ether.

Dr. Riggs, a veterinary surgeon, does not approve of giving chloroform to cows. He says: "It is no easy task to give ether or chloroform to animals generally, and it is usually quite as distressing to them as so slightly painful an operation as spaying. The operation of casting is a very awkward one, and needless, and interferes with the ease, if not the certainty, of the operation. The ovaries are attached near the back-bone; hence, when a cow stands up, the paunch and intestines fall away from them, and leave clear working space; but when she is thrown upon her side, the case is different, and when the cow is in good flesh, there is none too much space any way."

Dr. Riggs allows the cow to stand up, her head tied short, and an assistant holds her by the nose with clasps; a rope is tied loosely about her hind legs, to keep her from kicking; an assistant pushes her up against a partition or wall, and another aids in the first part of the operation. Thus, the cow is not at all alarmed or uncomfortable.

The skin is folded so that the hair can be shaved off where the cut is to be, and thus a straight line, three quarters of an inch wide and five inches long, is laid bare. The skin is then drawn up in a fold, at right angles, to this line and in the middle of it. The operator grasps this fold on one side of the shaved line, in his left hand, and his assistant grasps it on the other side; then, with a single, well-directed stroke, with a sharp knife, he severs the two thicknesses of hide exactly in the shaved line, letting go at the same time; a straight, clean cut through the skin is seen, and the cow suffers almost no pain at all—not so much as that produced by the blow from a whip. If the cut is made slowly, it is the most painful part of the operation. There is little feeling in the tissues forming the walls of the cavity of the abdomen, and when these are cut through, the hand may be easily introduced. The cow winces a little when the edges of the skin are rubbed, but shows no signs of pain.

The removal of the ovaries appears very easy, but it is not. If the operator has a strong, sharp thumb-nail, he can work or cut them loose; but if not, or if the ovary is strongly attached, the operator is obliged to do as the books say—"in short, *pull* them away"—and in this is the great danger to the cow; internal hemorrhage or inflammation is apt to ensue. Dr. Riggs avoids all this by the use of the "steel thumb-nail." This is simply a sharp knife, shaped like and bound upon the thumb-nail of the right hand. There is no danger of cutting in the wrong place. A clean cut does not produce bleeding, as was feared at first, and it greatly simplifies and shortens the operation. Dr. Riggs has never operated upon a cow with this instrument when she struggled or attempted to get down, but once, and then she was a little nervous, and came down upon her knees, but soon got up again. Usually there is no struggling throughout the operation.

32. **Calomel for Cows.**—A correspondent of the *American Farmer* writes: "I wish you would say to your readers that calomel, in one-ounce doses, will

cure a cow of almost any disease. At least, let me give my experience. I have two fine, valuable cows; they have had, it seems to me, some of the worst diseases that prevail—black-tongue, murrain, dry murrain, etc.—and when I saw they were dying, I mixed one ounce of calomel in dry corn-meal, which they would lick up, and it has never failed to cure."

33. **Keep Cows Gentle.**—If you milk out doors, with the cow loose, provide good stools for each milker. See that they are never used to pound the cow with; and never allow man or woman to kick or pound a cow in the stable or milking yard. If gentle means will not make a cow gentle, harsh means never will. It may be necessary to reduce a cow to obedience by a little punishment—to teach her, as you would a horse or ox, that you are master; but to accomplish this, never use anything but a light lash or smart switch, and never use that in anger. An angry man is a fool, compared with a sensible cow.

34. **Ayrshire Cows.**—In Massachusetts, the improvement of dairy stock by the introduction of Ayrshire blood has become so apparent, that no argument could induce those acquainted with their value to return to the hazards of native breeding. We could point to farmers in Essex, Middlesex, and Worcester counties, who, under the most prudent management, avail themselves of every opportunity to introduce Ayrshire blood into their herds, and our own observation teaches us that the importations of the Massachusetts Society for Promoting Agriculture, of Capt. Randall, of New Bedford, and others, have been vastly beneficial to our dairy stock. The bulls of this breed can be traced wherever they have been, by the good stock they have left behind them. One of them was kept upon a secluded farm in Essex County, and rendered it famous for its fine dairy cows. Another gave superior character to the herd of one of our well-known farmers, and to all the dairies in his neighborhood. An imported Ayrshire cow, not far from us, has produced, through a variety of mixtures and pure breeding, a little herd of cows and heifers of the highest uniformity of excellence.

35. **Poor Butter Cows.**—The *Veterinarian* gives a remedy for this difficulty with cows that are well kept, and whose milk has been previously rich in butter. It is to these that the remedy is principally directed. The remedy consists in giving the animal two ounces of the sulphuret of antimony, with three ounces of coriander seeds, powdered and well mixed. This is to be given as a soft bolus, and followed by a draught composed of half a pint of vinegar, a pint of water, and a handful of common salt, for three successive mornings, on an empty stomach.

This remedy, according to the author, rarely fails, and the milk produced some days after its exhibition is found to be richer in cream. The first churning yields a larger quantity of butter, but the second and third are still more satisfactory in their results.

A letter from a farmer states that he had fourteen cows in full milk, from which he obtained very little butter, and that of a bad quality. Guided by the statements of M. Deneubourg, which had appeared in the *Annales Vét-*

crinaires, he had separately tested the milk of his cows, and found that the bad quality of it was owing to one cow only, and that the milk of the others yielded good and abundant butter. It was, therefore, clearly established that the loss he had so long sustained was to be attributed to this cow only. He at once administered the remedy recommended by M. Deneubourg, which effected a cure.

36. **Winter Feed of Orange County Dairy Cows.**—Mr. C. Edward Brooks, one of the best dairymen in the county, claims that rye makes more milk than corn or oats, or other meal. Brewers' grains were formerly bought so as to cost 6 cents delivered at the farm, but now, at 12 cents, they are not so profitable as rye feed at 75 cents per bushel. Oats he esteems the poorest kind of grain for milk. He thinks that by currying a cow, and keeping her and her stable scrupulously clean, she will give her full quantity of milk on half the feed required if she is neglected. His daily allowance to each cow is five pounds of meal, either corn, corn and oats, or buckwheat or wheat bran, changing the kind frequently—for practice approves what theory teaches, that animals thrive best on a frequent change of diet. The animals are fed and milked at regular hours—generally at four o'clock in the afternoon and six in the morning; in winter, somewhat earlier in the afternoon and later in the morning. Care is taken to observe great punctuality as to time of milking, for the animals give much less trouble and thrive better. Mr. Brooks chaffs his hay, steeps it in warm water to soften it, and sprinkles the meal over it, mixing it thoroughly. Throughout the day as much long hay is fed as the cows will eat. The feed is mixed in a long box, shaped like an ordinary bath-tub, which runs on small iron truck-wheels, one at either end, and two at the sides, half way between. This is a very convenient method for carrying the whole mess along the passage between the stalls, and with a wooden scoop giving to each cow her share as her stall is passed. The water to steep the hay is heated in a caldron, in a small out-building, and conducted to the cow-stable through a small tin pipe.

Mr. Seeley C. Roe, near Chester, a large dairyman and an intelligent farmer, thinks that half-clover hay, well made, and half grain, is better for milk production than twice as much timothy with grain. He does not cut and steep his hay, but dampens it with cold water, and adds meal, as usual. He finds it an excellent plan to feed buckwheat whole, and prepares it by boiling the grain with the hulls on, and when it has become thoroughly soaked, puts it into the feed-box at the rate of two quarts to each cow. He adds to this two quarts of dry meal, and the heat and steam of the cooked buckwheat cooks the meal. Four quarts of this mixture are allowed to each cow—two in the morning and two at night—and the animals are kept on this feed until turned out to grass.

Mr. Gregory has an eight-horse power engine for cutting hay, threshing, grinding, etc., and uses the waste steam for steaming his hay. He has constructed a large chamber, capable of holding one hundred bushels of cut hay, which, before being steamed, is dampened. The steam-pipe from the engine empties into the chamber, and the hay is steamed for about a quarter of an hour, and then fed to the stock unmixed with meal—that is, given in the form of a warm mash.

37. **Sugar-Cane for Cows.**—If the Chinese sugar-cane does not prove to be a profitable sugar-making plant, we think it will be a profitable one for forage. The *Homestead* says that Deacon Edward Hayden, of East Hartford, Conn., has raised the Chinese sugar-cane for two years, and has used it for feeding milch cows with great success. The first year the stalks were left in the field, scattered about, we believe, and occasionally in dry weather brought to the barn to the cows, which ate them up clean, stalks and all. This was merely a sort of accidental experiment, as no especial value was set upon the canes. The past year he raised more, shocked in the field, and left it there. It cured well, and the cows ate it with great avidity, and Mr. Hayden esteems it as a great milk-producing diet.

38. **Feeding Roots.**—I have a word to say on winter feed for stock. It is more by way of query, and for feeders to think of, than by way of instruction. My experience in feeding domestic animals is not sufficient to warrant me in giving instruction. I have served my time in too rough a school for that. I have fed a good deal of hay, worth from $1 50 to $5 a tun; and corn from 10 to 25 cents a bushel, and other grain in proportion, and straw absolutely valueless. While living in such a district, I have often been asked the question, Why I did not raise more roots for my cattle? I answered: Simply because it would not pay. I did buy a lot of ruta bagas one autumn, delivered at my house at six cents a bushel, and the use of them taught me that they were dear food. I would now, if living in such a district, feed roots to stock just so far as I thought necessary to keep the animals in good health, and no more; not if I could buy at the same price, which was one fourth the price of sound corn; and I question the economy of feeding any kind of roots at the same rate of value to any greater extent than is required for health. That roots, particularly white turnips, are too largely fed in cold weather to young cattle, I have no doubt. They are so full of water that too much of it is taken into the stomach with the food. If roots, or any other watery food, are too largely fed to milch cows before and after calving, you will be sure to have a mean calf. If we will think, and take reason for a guide, as to what man requires for healthy food, we shall not go far wrong with domestic animals. Man likes roots occasionally, and so he does soup, or other sloppy food; but what would he be good for if fed week after week upon such watery stuff as turnips, or such porridge as some people compel their cattle to eat? After all, this question of winter feeding is a question of values; and it is not alone the value, counted by first cost, but the value of results. Now, what is the use of giving my opinion that this or that kind of food is the best, or most economical, when I can not say of a single thing, I *know*. I don't know, and don't know anybody who does. It is all guess-work, and at the present price of cattle-food, it is expensive guessing.

39. **Wintering Cows.**—The method of feeding cows in winter is not so important as it is to make the change from grass to hay and from hay to grass without producing any deterioration in their condition. It is highly important, if your cows are giving milk upon autumn pasture, that you do not allow them to fall off in milk or flesh for want of a little extra feed. I have never found anything quite equal to corn-meal for cow-feed, particularly when you are making butter. It may not be necessary nor economical to feed cows meal in autumn, even if pasture does fail, if you have green corn-stalks, pumpkins, turnips, cabbage, etc., which must be consumed, because not good to keep through winter. But in spring, when cows are first turned to grass, they are very apt to fall away, and then it will be found to be good economy to feed meal every night in the yard, and so it will before the cows are turned out, if not in first-rate condition.

I see the calculation of one writer that corn-meal, thus fed, was worth $3 a bushel, fed at the rate of one quart a day to a cow, for twenty or thirty days. He says:

"I have also found, by other experiments, that there is a great difference in the manner of getting animals to grass. When turned out early, with little or no other feed, they fall away greatly; on the contrary, if fed all the good hay they will eat, night and morning, with a judicious feeding of meal of some kind (and I prefer mixed feed—that is, mixing the different grains together before they are ground—to any one variety), they will soon begin to gain finely by such a course, and carry their extra weights through the season. In an experiment now being conducted, I have a cow that has, since the first of December last, been quietly laying on her two pounds per day (or nearly so), and her feed has been only moderate, as I am no advocate for forcing, but simply good fair keeping and care; then, with good animals, we are sure of a fair remuneration for care and feeding.

"I would that what I have already written could reach the eye of every farmer in these United States, and that each one would set himself about making at least one experiment in the care of farm-stock."

40. **Cows Badly Wintered are Unprofitable.**—A farmer can not afford to winter any stock poorly, and least of all, milch cows, or those which are to produce calves in the spring. Look at the following statement, and see if the Western Reserve farmers can afford thus to winter cows.

A letter from Warren, Trumbull County, Ohio, written in April, 1860, says: "The present times are the worst we have ever known in this country. Cows and cattle are dying by the hundred; six hundred head have died within the three adjoining counties this winter for want of food. The weather is still dry and cold."

This is only one, among many illustrations, of the folly and wrong committed by Western farmers in keeping more stock than can be housed and fed. This is the case all through the Western country. Travel over any portion of it, and you will see scores of cattle shivering in the cold storms of winter, without shelter, and so poorly fed that if they live through the severe season it is more by chance than for any care which they receive. On the prairies, cattle can be kept so easily in summer that every one is tempted to overstock himself to such a degree, while the grass is green, that a portion must die in winter. Now we would say to the farmers, you can not afford this. Every one of these six hundred cattle which perished in Ohio could have been sold at a low price by the owners, who were short of feed, to others who would have carried them through the winter. And how infinitely better this would have been than to allow such an amount of stock to die of starvation!

It is not only in Trumbull County that cattle have perished in winter; the entire West has suffered equally in this respect with Ohio. On the Illinois prairies, where there is no limit to the amount of hay that might be cut, cattle have died in large numbers for the want of a quarter more hay than they had eaten during the winter. And yet the farmers of those districts persevere in their criminal folly, although the result of each year's experience ought to be sufficient to open their eyes to a proper realization of the truth. No farmer can afford to keep more cows or horned cattle than he can provide hay for at the rate of two tuns per head; he should never attempt to keep more cattle than he can house warmly, unless he has hay to waste, and is willing to sacrifice at least one fourth of the stock.

It is one of the most painful sights to be met with in traveling through the West, while passing the little cabins of the new settlers, to see cows and calves, oxen and young stock, all huddling together, without any shelter from the cold winter storm. Is it any wonder that one half of these famished, neglected things should perish before spring? Farmers, you must learn wisdom from the calamities of severe winters. Keep fewer cattle, and keep them better, and you will make more money. We might give hundreds of extracts from country papers to convince you that feed is scarce every year, but it would be superfluous. The richest corn country of Indiana has suffered quite as much as its sister States during many hard winters; and this is because it is a rich corn country, and rich in nothing else. Large farms without grass; cattle without food, dying by thousands; farmers losing all their stock, "because it is a late spring," or, rather, because they undertook to winter an unreasonable number. Will the farmers of our country never take advantage of the experience of the past, and learn that they can not afford these wasteful and ruinous sacrifices?

41. **To Choose a Good Milch Cow.**—Select from a good breed. We prefer the Devons—bright bay red. The Durhams are roan, red, white, and mixtures of these colors. Ayrshire cows are generally red and white spotted. Herefords, red or darker colored, with white faces. Alderneys, pale red and mixed with white. These are the principal colors of the several breeds, of which the Durhams are the largest and Alderneys the smallest. Different individuals will contend for each breed being the best and only one that should be selected for their milking qualities. But animals of each breed, and of crosses of them, often prove remarkable milkers, and so do some of the

native stock of the country. Two families of cows—one owned by Colonel Jaques, of Ten Hills Farm, near Charlestown, Mass., and one owned by Major John Jones, of Wheatland Farm, near Middletown, Del.—were called native breed, yet were the most remarkable butter-makers we have ever seen. We have seen Col. Jaques produce good butter in three minutes, by simply stirring the cream in a bowl. If we were about selecting a milch cow, we would endeavor to get one out of such a herd of good milkers; one with a soft, velvety-feeling skin, slim neck, fine legs, broad stern, with what is called a large escutcheon—that is, the hair of the stern pointing inward; a large udder, slim teats, and large veins, commonly called milk veins, on the belly. Above all things, select your cow of a gentle, pleasant countenance, because a first-rate milker may be so vicious as to be worthless. Do not look for flesh, as the best cows are seldom fat; their hip-bones are often very prominent, and they have the appearance of being low in flesh. A beefy cow is seldom a good milker.

The next thing is, what is a good milker? That is, how much milk must she yield per day? A cow that will average 5 quarts of milk a day through the year, making 1,825 quarts, is an extraordinary good cow. One that will yield 5 quarts a day for 10 months is a good cow, and one that will average 4 quarts during that time is more than an average quality. That would make 1,200 quarts a year, which, at three cents a quart, is $36. We believe the Orange County milk dairies average about $40 per cow, and the quality of the cows is considerably above the average of the country.

It is as important to keep a cow good as it is to get her good. This can never be done by a careless, lazy milker. Always milk your cow quick and perfectly clean, and never try to counteract nature by taking away her calf. Let it suck, and don't be afraid "it will butt her to death." It will distend the udder, and make room for the secretion of milk. Be gentle with your cow, and you will have a gentle cow. Select well, feed well, house well, milk well, and your cow will yield well.

42. **The Different Breeds of Cows.**—We advise you to examine, in this connection, the different breeds of cows, so that the general appearance, so far as outline of form is concerned, may be very well understood. Good and full descriptions may be found in a standard work upon "Milch Cows and Dairy Farming," edited by Charles L. Flint, secretary of the Massachusetts State Board of Agriculture, and we give a few short extracts from that work, upon each breed, as follows:

43. **Ayrshire Cows Described.**—"The Ayrshires are justly celebrated throughout Great Britain and this country for their excellent dairy qualities. Though the most recent in their origin, they are pretty distinct from the other Scotch and English races. In color, the pure Ayrshires are generally red and white, spotted or mottled—not roan, like many of the short-horns, but often presenting a bright contrast of colors. They are sometimes, though rarely, nearly or quite all red, and sometimes black and white; but the favorite color is red and white brightly contrasted, and by some, straw-

berry color is preferred. The head is small, fine, and clean; the face long, and narrow at the muzzle, with a sprightly, yet generally mild, expression; eye small, smart, and lively; the horns short, fine, and slightly twisted upward, set wide apart at the roots; the neck thin; body enlarging from fore to hind quarters; the back straight and narrow, but broad across the loin; joints rather loose and open; ribs rather flat; hind quarters rather thin; bone fine; tail long, fine, and bushy at the end; hair generally thin and soft; udder light color and capacious, extending well forward under the belly; teats of the cow of medium size, generally set regularly and wide apart; milk-veins prominent and well developed. The carcass of the pure-bred Ayrshire is light, particularly the fore quarters, which is considered by good judges as an index of great milking qualities; but the pelvis is capacious and wide over the hips.

"On the whole, the Ayrshire is good-looking, but wants some of the symmetry and aptitude to fatten which characterize the short-horn, which is supposed to have contributed to build up this valuable breed on the basis of the original stock of the county of Ayr."

44. **Yield of Milk of Ayrshire Cows.**—"Youatt estimates the daily yield of an Ayrshire cow, for the first two or three months after calving, at five gallons a day, on an average; for the next three months, at three gallons; and for the next four months, at one gallon and a half. This would be 850 gallons as the annual average of a cow; but, allowing for some unproductive cows, he estimates the average of a dairy at 600 gallons per annum for each cow. Three gallons and a half of the Ayrshire cow's milk will yield one and a half pounds of butter. He therefore reckons 257 lbs. of butter, or 514 lbs. of cheese, at the rate of 24 lbs. to 28 gallons of milk, as the yield of every cow, at a fair and perhaps rather low average, in an Ayrshire dairy, during the year. Aiton sets the yield much higher, saying that "thousands of the best Ayrshire dairy-cows, when in prime condition and well fed, produce 1,000 gallons of milk per annum; that in general three and three-quarters to four gallons of their milk will yield a pound and a half of butter; and that $27\frac{1}{2}$ gallons of their milk will make 21 lbs. of full-milk cheese." Mr. Rankin puts it lower—at about 650 to 700 gallons to each cow; on his own farm of inferior soil, his dairy produced an average of 550 gallons only."

45. **Yield of Milk of Breeds Compared.**—"In a series of experiments on the Earl of Chesterfield's dairy farm, at Bradley Hall, interesting as giving positive data on which to form a judgment as to the yield, it was found that, in the height of the season, the Holderness cows gave seven gallons and one quart per diem; the long-horns and Alderneys, four gallons and three quarts; the Devons, four gallons and one quart; and that, when made into butter, the above quantities gave, respectively, $38\frac{1}{2}$ ounces, 28 ounces, and 25 ounces.

"The Ayrshire, a cow far smaller than the Holderness, at five gallons of milk and 34 ounces of butter per day, gives a fair average as to yield of milk, and an enormous production of butter, giving within four and a half ounces as much from her five gallons as the Holderness from her seven gallons and one quart; her rate being nearly seven ounces to the gallon, while that of the Holderness is considerably under six ounces.

"According to Mr. Harley, the most approved shape and marks of a good dairy cow are as follows: Head small, long, and narrow toward the muzzle; horns small, clear, bent, and placed at considerable distance from each other; eyes not large, but brisk and lively; neck slender and long, tapering toward the head, with a little loose skin below; shoulders and fore quarters light and thin; hind quarters large and broad; back straight, and joints slack and open; carcass deep in the rib; tail small and long, reaching to the heels; legs small and short, with firm joints; udder square, but a little oblong, stretching forward, thin-skinned, and capacious, but not low hung; teats or paps small, pointing outward, and at a considerable distance from each other; milk-veins capacious and prominent; skin loose, thin, and soft, like a glove; hair short, soft, and woolly; general figure, when in flesh, handsome and well proportioned."

46. **The Ayrshires for the Dairy — Their Value Considered.**—Upon this point Mr. Flint quotes and indorses the following opinion:

"For purely dairy purposes, the Ayrshire cow deserves the first place. In consequence of her small, symmetrical, and compact body, combined with a well-formed chest and a capacious stomach, there is little waste, comparatively speaking, through the respiratory system; while, at the same time, there is very complete assimilation of the food, and thus she converts a large proportion of her food into milk. So remarkable is this fact, that all dairy farmers who have any experience on the point, agree in stating *that an Ayrshire cow generally gives a larger return of milk for the food consumed than a cow of any other breed.* The absolute quantity may not be so great, but it is obtained at a less cost; and this is the point upon which the question of profit depends."

47. **The Jersey or Alderney Cow.**—There is a great diversity of opinion about the value of this breed of cows. It is our opinion that they are the most valuable of all, where only one or two are to be kept, and when butter is the main object. The milk of an Alderney cow is the richest of all for household consumption, and makes the most and best butter; and the cow is generally very docile, and in her native country is frequently kept upon very much such food as we keep a pig upon in this country. The greatest objection that we have heard urged upon them is their small size and lack of beauty, as compared with the symmetrical forms of Durhams, Devons, Ayrshires, and some of our natives. It is objected, too, that butter and cheese made from Alderney cows' milk will not keep, because it is "too rich." If it is mixed with other milk, it improves both, for then the butter and cheese are rich, and have no lack of keeping qualities.

48. **Origin and Description of Jersey Cows.**—"The Jersey race is supposed to have been derived originally from Normandy, in the northern part of

Ayrshire Cow

Ayrshire Bull

Jersey Cow

Jersey Bull

Short-horn Cow

Short-horn Bull

Imported Dutch Cow

Imported Dutch Bull

DIFFERENT BREEDS [illegible] TED STATES

PLATE IV.

(Page 44.)

This picture is a study of four of the improved breeds of cattle which are briefly described in Chapter I., pages 31 to 51; and with the other two upon Plate III., the reader has, as it were, at one view, representatives of the Durham, Devon, Hereford, Ayrshire, Jersey or Alderney, and the improved Dutch—six of the most important breeds of imported cattle. These beautiful pictures, with what we have said of the animals, will give those who have no opportunity of studying them alive, a very good insight of their varied form and character. For this they should be highly valued, as they are true representations from life.

France. The cows have been long celebrated for the production of very rich milk and cream, but till within a quarter of a century they were comparatively coarse, ugly, and ill-shaped. Improvements have been very marked, but the form of the animal is still far from satisfying the eye. The head of the pure Jersey is fine and tapering, the cheek small, the throat clean, the muzzle fine and encircled with a light stripe, the nostril high and open; the horns smooth, crumpled, not very thick at the base, tapering, and tipped with black; ears small and thin, deep orange color inside; eyes full and placid; neck straight and fine; chest broad and deep; barrel hooped, broad and deep, well ribbed up; back straight from the withers to the hip, and from the top of the hip to the setting on of the tail; tail fine, at right angles with the back, and hanging down to the hocks; skin thin, light color, and mellow, covered with fine, soft hair; fore legs short, straight, and fine below the knee; arm swelling and full above; hind quarters long and well filled; hind legs short and straight below the hocks, with bones rather fine, squarely placed, and not too close together; hoofs small; udder full in size, in line with the belly, extending well up behind; teats of medium size, squarely placed, and wide apart, and milk-veins very prominent. The color is generally cream, dun, or yellow, with more or less white, and the fine head and neck give the cows and heifers a fawn-like appearance, and make them objects of attraction in the park; but the hind quarters are often too narrow to look well, particularly to those who judge animals from the amount of fat they carry."

49. **Fattening Properties of a Jersey Cow.**—"It is asserted by Colonel Le Couteur, of the island of Jersey, that, contrary to the general opinion here, the Jersey cow, when old and no longer wanted as a milker, will, when dry and fed, fatten rapidly, and produce a good quantity and excellent quality of butchers' meat. An old cow, he says, was put up to fatten in October, 1850, weighing 1,125 lbs., and when killed, the 6th of January, 1851, she weighed 1,330 lbs., having gained 205 lbs. in 98 days, on 20 lbs. of hay, a little wheat-straw, and 30 lbs. of roots—consisting of carrots, Swedes, and mangel-wurzel—a day."

50. **The Short-horn Durham Cow.**—There is no room for dispute about the Durhams being good for beef. For butter or for general dairy purposes, I should not choose them. Mr. Flint says:

"In sections where the climate is moist and the food abundant and rich, some families of the short-horns may be valuable for the dairy; but they are most frequently bred exclusively for beef in this country, and in sections where they have attained the highest perfection of form and beauty, so little is thought of their milking qualities, that they are often not milked at all, the calf being allowed to run with the dam."

Crosses, however, of this breed upon other breeds have produced excellent milkers. In Westchester County, N. Y., there is a valuable strain of dairy stock known as "Dutch and Durham."

51. **The Dutch Cow.**—The old Holland stock shows a very symmet-

rical, handsome form, but not quite as much so as the Durham, which was made up, it is generally supposed, by a cross of the Dutch breed upon the Teeswater stock. The Dutch cow is not as heavy an animal as the improved Durham, but she is more highly esteemed for dairy purposes.

52. **The Hereford Cow.**—"The Hereford cattle derive their name from a county in the western part of England. Their general characteristics are a white face, sometimes mottled; white throat, the white generally extending back on the neck, and sometimes, though rarely, still farther along on the back. The color of the rest of the body is red, generally dark, but sometimes light. Eighty years ago the best Hereford cattle were mottled or roan all over; and some of the best herds, down to a comparatively recent period, were either all mottled, or had the mottled or speckled face. The expression of the face is mild and lively; the forehead open, broad, and large; the eyes bright and full of vivacity; the horns glossy, slender, and spreading; the head small, though larger and not quite so clean as that of the Devons; the lower jaw fine; neck long and slender; chest deep; breast-bone large, prominent, and very muscular; the shoulder-blade light; shoulder full and soft; brisket and loins large; hips well developed, and on a level with the chine; hind quarters long and well filled in; buttocks on a level with the back, neither falling off nor raised above the hind quarters; tail slender, well set on; hair fine and soft; body round and full; carcass deep and well formed, or cylindrical; bone small; thigh short and well made; legs short and straight, and slender below the knee; as handlers very excellent, especially mellow to the touch on the back, the shoulder, and along the sides, the skin being soft, flexible, of medium thickness, rolling on the neck and the hips; hair bright; face almost bare, which is characteristic of pure-bred Herefords. They belong to the middle-horned division of the cattle of Great Britain, to which they are indigenous."

There are individual good milkers among the Herefords, as there are among the Durhams, but like them, we must say they are better for beef than milk. We certainly never should select the Hereford breed for dairy purposes. The form of the cow, as represented among the specimens we have seen of the best herds in this country, is that of a beef-producing animal, or a breed for good working oxen, for which it is noted.

53. **The Devon Cow.**—"This beautiful race of cattle dates farther back than any well-established breed among us. It goes generally under the simple name of Devon; but the cattle of the southern part of the county, from which the race derives its name, differ somewhat from those of the northern, having a larger and coarser frame, and far less tendency to fatten, though their dairy qualities are superior.

"The North Devons are remarkable for hardihood, symmetry, and beauty, and are generally bred for work and for beef rather than for the dairy. The head is fine and well set on; the horns of medium length, generally curved; color usually bright blood-red, but sometimes inclining to yellow; skin thin and orange-yellow; hair of medium length, soft, and silky, making theanimals remarkable fine handlers; muzzle of the nose white; eyes full and mild; ears yellowish, or orange-color inside, of moderate size; neck rather long, with little dewlap; shoulders oblique; legs small and straight, and feet in proportion; chest of good width; ribs round and expanded; loins of first-rate quality, long, wide, and fleshy; hips round, of medium width; rump level; tail full near the setting on, tapering to the tip; thighs of the bull and ox muscular and full, and high in the flank, though in the cow sometimes thought to be too light; the size medium, generally called small.

"As milkers, they do not excel, perhaps they may be said not to equal, the other breeds, and they have a reputation of being decidedly below the average. In their native country the general average of a dairy is one pound of butter per day during the summer.

"They are bred for beef and for work, and not for the dairy, and their yield of milk is small, though of a rich quality.

"On the whole, whatever may be our judgment of this breed, the faults of the North Devon cow can hardly be overlooked from our present point of view. The rotundity of form and compactness of frame, though they contribute to her remarkable beauty, constitute an objection to her as a dairy cow, since it is generally thought that the peculiarity of form which disposes an animal to take on fat is somewhat incompatible with good milking qualities, and hence Youatt says: 'For the dairy, the North Devons must be acknowledged to be inferior to several other breeds. The milk is good, and yields more than the average proportion of cream and butter; but it is deficient in quantity.' He also maintains that the value of this breed for milk could not be improved without probable or certain detriment to its grazing qualities.

"But the fairest test of its fitness for the dairy is to be found in the estimation in which distinguished Devon breeders themselves have held it in this respect. A scale of points of excellence in this breed was established some time ago by the best judges in England; and it has since been adopted, with but slight changes, in this country. These judges, naturally prejudiced in favor of the breed, if prejudiced at all, made this scale to embrace one hundred points, no animal to be regarded as perfect unless it excelled in all of them. Each part of the body was assigned its real value in the scale: a faultless head, for instance, was estimated at four; a deep, round chest at fifteen, etc. If the animal was defective in any part, the number of points which represented the value of that part in the scale was to be deducted *pro rata* from the hundred, in determining its merits. But in this scale the cow is so lightly esteemed for the dairy, that the udder, the size and shape of which is of the utmost consequence in determining the capacity of the milch cow, is set down as worth only *one point*, while, in the same scale, the horns and ears are valued at two points each, and the color of the nose and the expression of the eye are valued at four points each. Supposing, therefore, that each of these points was valued at one dollar, and a perfect North

Devon cow was valued at one hundred dollars; then another cow of the same blood, and equal to the first in every respect, except in her udder, which is such as to make it certain that she can never be capable of giving milk enough to nourish her calf, must be worth, according to the estimation of the best Devon breeders, ninety-nine dollars! It is safe, therefore, to say that an animal whose udder and lacteal glands are regarded, by those who best know her capacities and her merits, as of only one quarter part as much consequence as the color of her nose, or half as much as the shape and size of her horns, can not be recommended for the dairy. The improved North Devon cow may be classed, in this respect, with the Hereford, neither of which have well-developed milk-vessels—a point of the utmost consequence to the practical dairyman."

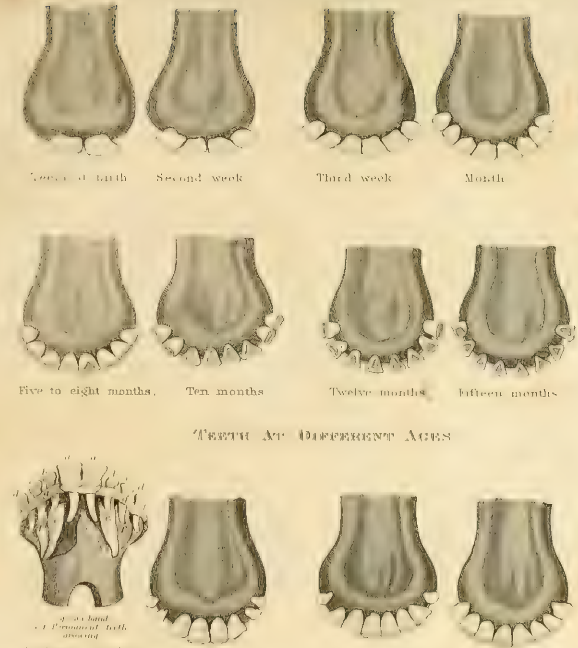
54. **The Milk-Mirror.**—This is a term given in the Guénon method of selecting good cows, to the escutcheon formed by the change of direction in the hair on the rear part of the udder and parts adjacent. If this mirror is large, it is supposed to indicate a good milker. For the better understanding of it, we recommend a careful study of the "milk-mirror," and see how it is generally developed upon all real good milkers—that is, good for quantity rather than quality.

"Milk-mirrors vary in position, extent, and the figure they represent. They may be divided, according to their position, into mirrors or escutcheons, properly so called, or into lower and upper tufts, or escutcheons. The latter are very small in comparison with the former, and are situated in close proximity to the vulva, as seen in different breeds of cows. They are very common on cows of bad milking races, but are very rarely seen on the best milch cows. They consist of one or two ovals, or small bands of up-growing hair, and serve to indicate the continuance of the flow of milk. The period is short in proportion as the tufts are large. They must not be confounded with the escutcheon proper, which is often extended up to the vulva. They are separated from it by bands of hair, more or less large, as you will find from careful examination."

It requires some skill to determine the exact size of a milk-mirror, since it is not equally well defined in all cows, being at first sight apparently large in some, which, upon close examination, will show faults—that is, that the escutcheon of out-growing hairs is broken by tufts of down-growing hairs. Mr. Flint says:

"We often find cows whose milk-mirror at first sight appears very large, but which are only medium milkers; and it will usually be found that lateral indentations greatly diminish the surface of up-growing hair. Many errors are committed in estimating the value of such cows, from a want of attention to the real extent of the milk-mirror.

"All the interruptions in the surface of the mirror indicate a diminution of the quantity of milk, with the exception, however, of small oval or elliptical plates, which are found in the mirror, on the back part of the udders of the best cows.



Teeth At Different Ages

Forms [illegible] Milk Mirror

PLATE V.

(Page 48.)

This is a very instructive picture to every young farmer, and there are a good many old ones who may make of it a valuable study. Many persons are not aware that the age of a suckling calf, week by week, can be told by examining the teeth. Look at these drawings and see how easy it is to learn the art—an art which every farmer's boy should understand. So the age of a cow, as well as a horse, can be told from year to year, by looking at the teeth, more certainly than by the horns. For this purpose this plate possesses great value; but it has a greater one in the illustration of what is now well known as the "milk mirror," which is described at ¶ 54, and much more fully in Guénon's work, from which the theory is derived. In this plate the mirror is represented by coloring the picture so as to show the field of upturned hair around the udder in its most fully developed form upon No. 1, and quite defective in No. 4. By studying these, and comparing them with living cows, something of the theory may be learned. It is very fully illustrated in Flint's work upon milch cows and dairy farming. It is a subject worthy of the attention of all farmers.

In a fat cow, with an inflated udder, the mirror would appear larger than it really is; while in a lean cow, with a loose and wrinkled udder, it appears smaller. Fat will cover faults; this is a fact to be kept in mind in selecting a cow; because good fatting qualities are not the qualities which the purchaser is desirous of obtaining.

"These marks, though often seen on many good cows, should be considered as certain only when the veins of the perineum form, under the skin, a kind of net-work, which, without being very apparent, may be felt by a pressure on them, when the milk-veins on the belly are well developed, though less knotted and less prominent than in cows of the first class; in fine, when the udder is well developed, and presents veins which are sufficiently numerous, though not very large.

"There are cases where a knowledge and careful examination of the form and size of the mirror becomes of the greatest importance. It is well known that certain signs or marks of great milkers are developed only as the capacities of the animal herself are fully and completely developed by age. The milk-veins, for instance, are never so large and prominent in heifers and young cows as in old ones, and the same may be said of the udder, and the veins of the udder and perineum, all of which it is of great importance to observe in the selection of milch cows. Those signs, then, which in cows arrived at maturity are almost sufficient in themselves to warrant a conclusion as to their merits as milkers, are, to a great extent, wanting in younger animals, and altogether in calves, of which there is often doubt whether they shall be raised; and here a knowledge of the form of the mirror is of immense advantage, since it gives, at the outset, and before any expense is incurred, a somewhat reliable means of judging of the future milking capacities of the animal, or, if a male, of the probability of his transmitting milking qualities to his offspring."

55. **What Kind of Cows to Buy.**—"In buying dairy stock, the farmer generally finds it for his interest to select young heifers. They give the promise of longer usefulness. But it is often the case that older cows are selected, with the design of using them for the dairy for a limited period, and then feeding them for the butcher. In either case, it is advisable, as a rule, to choose animals in low or medium condition. The farmer can not ordinarily afford to buy fat; it is more properly his business to make it and to have i to sell. Good and well-marked cows, in poor condition, will rapidly gain in all flesh products when removed to better pastures and higher keeping, and they cost less in the original purchase."

56. **General Conclusions.**—We have now devoted all the space that we can afford to the subject of cows. We have given them a large share of our attention, because we consider them of more importance than any other single branch of our domestic animals. They not only furnish a great amount of food, in milk, cream, butter, cheese, and meat, when done furnishing milk, but they are the foundation of prosperity in American farming. "A good cow may produce a bad calf," but it is only a may-be—it does not

hold as a rule. It is therefore very important to select good cows, and keep none but good cows—certainly never breed from a poor one.

We shall now give some important facts relative to other branches of neat stock. And first we refer the reader to the following facts concerning bulls of various breeds.

57. **The Ayrshire Bull.**—In comparing this with those of other breeds, it should be borne in mind that the Ayrshires are not bred for beef, in their own country, as much as they are for dairy purposes. For working oxen, they are of fair quality, but not the best. For feeding purposes, they should be crossed with Durhams.

"It is the opinion of good breeders, that a high-bred short-horn bull and a large-sized Ayrshire cow will produce a calf which will come to maturity earlier, and attain greater weight, and sell for more money, than a pure-bred Ayrshire. This cross, with feeding from the start, may be sold fat at two or three years old, the improvement being especially seen in the earlier maturity and the size."

58. **The Jersey Bull.**—So far as beauty is concerned in the sexes, the males of the Jersey or Alderney stock have the largest share. It is a somewhat curious physiological fact, that the Alderney cows in this country produce two or three times as many bulls as heifers, so that bulls can generally be purchased at lower prices than cows.

"The bulls are usually very different in character and disposition from the cows, and are much inclined to become restive and cross at the age of three or four years, unless their treatment is uniformly gentle and firm. In all portraits of Jersey bulls, they are represented as handsomer animals than they are generally considered by American farmers.

59. **Short-horn or Durham Bull.**—This breed has been more largely imported and bred from in the United States than any, in fact all, others. It is the great beef-producing breed of the West, particularly in Ohio and Kentucky.

"The desirable characteristics of the short-horn bull may be summed up, according to the judgment of the best breeders, as follows: He should have a short but fine head, very broad across the eyes, tapering to the nose, with a nostril full and prominent; the nose itself should be of a rich flesh-color; eyes bright and mild; ears somewhat large and thin; horns slightly curved and rather flat, well set on a long, broad, muscular neck; chest wide, deep, and projecting; shoulders fine, oblique, well formed into the chine; fore legs short, with upper arm large and powerful; barrel round, deep, well ribbed home; hips wide and level; back straight from the withers to the setting on of the tail, but short from hip to chine; skin soft and velvety to the touch; moderately thick hair, plentiful, soft, and mossy."

This picture gives only a fair impression of the fine form of the best animals of this breed.

60. **The Dutch Bull.**—The form of Dutch and Durham bulls is not unlike. W. W. Chenery, of Watertown, Mass., whose name has since become famous

as being identified with the alarming cattle disease prevailing in Massachusetts in the summer of 1860, is one of the largest importers of the valuable stock known as the Dutch breed.

61. **The Hereford Bull.**—This always fairly represents this good breed of cattle. Good, at least, for beef, and excellent for working oxen. Their beef rates highest of all in the London market, and the few grades which have been brought to New York have been highly esteemed. The objection to them is, that they do not come so early to maturity, or, rather, to a salable condition, as the Durhams. The breeders of Herefords contend that the keeping that will starve Durhams will keep the Herefords in a thriving condition.

62. **The Devon Bull.**—In color and form a Devon bull is perfect; always of a pure bay-red color, of medium size, and progenitor of the handsomest working oxen in America. The deficiency in size of the pure Devons, for working oxen, is made up by crossing upon larger animals. These grade oxen make as fine beef as any brought to the New York market.

SECTION IV.—BEEVES.

Gross and Net Weight of Beef Cattle.—The ordinary rule of ascertaining the net weight of beef cattle from the live weight on the scales varies, according to quality, size, and age, and after all, is no rule at all, because it is entirely a matter of agreement between the parties at the time.

It also depends upon the locality. In New York, the net weight of the beef in the quarters only is wanted. In Boston, the hide and fat are included, counting those products equal to one quarter of the beef, or, rather, calling the whole five quarters. There the net weight of a fat bullock is estimated at 60 to 68 lbs. of each 100 of live weight. In extra fine animals the per-centage is higher.

In New York, where the hide and fat are left out of the calculation, the bullocks are estimated at 55 to 60 lbs. net to each 100 lbs. gross; and if the animal is very fine, the estimate runs from 61 to 64 lbs. net to each 100 lbs. gross. Extraordinary animals sometimes dress 65 or 66 lbs., and even higher, and ordinary and lean stock run from 55 down to 47 lbs., though not often below 50 lbs., or one half the live weight at home. The common practice at the West is, to weigh fatted cattle some hours after feeding and a little exercise, and calculate the net weight at 55 lbs. per 100 of the live weight.

64. **The Largest Bullock—The Great Massachusetts Steer.**—The question of "what is the greatest weight of any bullock?" we definitely answer and place on record in the following notices. The heaviest alive and dead was sold by John Sanderson, of Bernardstown, Mass., in February, 1862, to Bryan Lawrence, butcher, Centre Market, New York, by whom he was publicly exhibited, killed, and weighed. His live weight at home was 36 cwt. Here, when very empty, 33 cwt. His dead weight was, fore quarters, 743, 732—1,475 lbs. Hind quarters, 496, 502—998 lbs. Total, 2,473 lbs., after shrinking a week. This is within 2 lbs. of 75 per cent. of live weight. This steer had been kept in a small yard and stable, eating meal and hay two years; was eight years old; a cross of Durham and native Vermont stock. He girted back of shoulders, 10 ft. 8 in.; forward of hips, 11 ft. 8 in.; hight, 6 ft. 3 in.; length from horns to tail, 9 ft. 8 in.; breadth across hips, 3 ft. 6 in. This is the largest bullock of which we have any certain record. We also place upon record the weights of several other remarkable large bullocks. All stories of bullocks of 40 cwt. we disbelieve.

65. **The Washington Ox.**—The ox George Washington was 5 years, 9 months, and 14 days old when slaughtered, in the year 1840.

His live weight was	3,204 lbs.
Weight of one fore quarter	612 "
Weight of the other fore quarter	598 "
Weight of one hind quarter	487 "
Weight of the other hind quarter	477 "
2,174 lbs. of beef—70 lbs. per cwt. of live weight.	
Measurement from button to root of tail	9 ft. 7 in.
Girth	10 " 4 "
Hight	5 " 9 "
From hip to hip	2 " 9 "

The ox Red Jacket, killed March 5, 1851,

Weighed alive	3,080 lbs.
Weight of meat	2,114 "
Loss, 31 per cent.	

The ox John Hancock, killed the same time,

Weighed alive	2,910 lbs.
Weight of meat	1,946½ "
Loss, 33 per cent.	

Robert L. Pell's two-year-old heifer, fatted at Pellham Farm, 30 miles up the Hudson,

Weighed alive	2,000 lbs.
Weight of beef	1,380 "
Loss, 31 per cent.	

66. **A Big Ox in Olden Time.**—We print, as we find it, the following extract from "Thacher's Military Journal of the Revolution," under date of June 24, 1779:

"I have just had the satisfaction, with a number of gentlemen, of viewing a remarkably large *fat ox*, which has been presented by some gentlemen in Connecticut to his Excellency, Gen. Washington. He is 6 ft. 7 in. high, and weighs on the hoof 3,500 lbs., the largest animal I ever beheld."

67. **The Ox Leopard.**—An ox called "Leopard," raised and fed by Dr.

Wm. Elmer, of Bridgton, N. J., was slaughtered, Feb. 24, 1832, at the age of 6 years and 8 months. His live weight was 3,360 lbs. Size—length from nose to rump, 10 ft. 6 in.; from nose to end of tail, 15 ft.; girth behind fore shoulders, 9 ft. 8 in.; around the body, 10 ft. 9 in.; around the brisket, 10 ft. 3 in.; length from shoulder to rump, 7 ft.; along the back from horns, 9 ft.; width across the hip, 2 ft. 10½ in.; hight of fore shoulder, 5 ft. 6 in.; behind, 5 ft. 8 in.; circumference of leg below the knee, 1 foot.

68. **Two Big Oxen in Pennsylvania.**—We have a letter from James Stewart, Pennsylvania, and another from Andrew M. Frantz, giving the weight of two bullocks heavier than the Washington. One known as the "Lancaster County Ox," Mr. Stewart writes, "was owned and fed by Emanuel Landis, near this city; was a half-bred Durham, deep red, large fore quarters, long, fine horns, and was over seven years old. Wm. F. Miller, of Lancaster, purchased him for $800, and slaughtered him on the 22d of February, 1858. This ox weighed:

Live weight		3,387 lbs.
Net weight		2,409 "
Weight of one fore quarter	747 lbs.	
Weight of the other fore quarter	760 "	
Weight of one hind quarter	469 "	
Weight of the other hind quarter	442 "	
	2,418 lbs.	
Deduct weight of hooks for weighing	9	
Total net weight		2,409 lbs.

"The Berks County ox, that was butchered some years ago in Philadelphia, weighed as follows:

Live weight		3,350 lbs.
Net weight		2,388 "
Weight of one fore quarter	732 lbs.	
Weight of the other fore quarter	728 "	
Weight of one hind quarter	464 "	
Weight of the other hind quarter	464 "	
Total net weight		2,338 lbs.

"There has long been a generous rivalry between the farmers of Berks and Lancaster counties in regard to which could grow the fattest and largest oxen. As it now stands, Lancaster is ahead, but we may look out for something ere long greater still from *Old Berks*, for the resources of that county are astonishing, as even politicians can testify.

"There was another steer butchered in this city, in February, 1856, by David Killinger, owned and fed by Abram Landis, of Manheim township, that netted 2,108 lbs., but that weight, and greater, has been frequently attained in this State, and even in this county. The first two (whose weights I have given) I will not say are the largest cattle ever slaughtered, even in Pennsylvania, but they are the largest that have ever come under my observation, and in regard to whose weight there was no dispute. I, however, entirely concur with the writer in the *Tribune*, that there *never* was an ox fed to the weight of 4,000 lbs. gross. An animal that will weigh 613 lbs. more than the one butchered in this city in February last, has certainly never been yet produced."

Mr. Frantz says the Berks County ox was fed by a man named Soetz, and was slaughtered, he thinks, in 1846. If so, his weight should have been known here and remembered, but it was not by one of the butchers and others that we thought likely to know, of the many of whom we sought information. We have often heard of heavier bullocks, but lack the proof, as in the case below. The above figures are now matters of record, where they can be referred to in future.

69. **The Saratoga Big Bullock.**—Since writing the above, we see the following in the *Country Gentleman* of May 27, 1860:

"The *Saratoga County Press* says that J. M. Cole, of Saratoga Springs, slaughtered an ox, in 1847, whose live weight was 3,520 lbs.; dressed, 2,567 lbs."

Let Mr. Cole give us the vouchers. If he has made an ox of that weight, he has probably beaten the world, and should give the world the proof. It wants to know certainly the weight of the heaviest bullock.

70. **Weights of the Crystal Palace Show Cattle.**—The following are the net weights of the nine head of fat bullocks, exhibited as a show at the Crystal Palace. Some of them were full-blood Kentucky and Ohio Durhams, and others, grades of that blood. They were bought by Jim Irving, of Washington Market, and fairly weighed as follows:

The best pair weighed—one, 2,178 lbs.—and his quarters, 604 and 612 lbs. for the fore quarters, and 480 and 482 lbs. for the hind quarters. The other weighed 2,066 lbs.—the fore quarters 570 and 568 lbs., and the hind ones 470 and 458 lbs.

Another pair weighed together 3,680 lbs. The old cow, which was excessively fat, weighed 1,460 lbs., dressing, it is said, 73 lbs. per cwt. The best steer dressed 72½ lbs. per cwt. The other four head weighed 2,024, 2,008, 1,930, and 1,860 lbs.

Forty head of Illinois grade Durhams, five and six years old, sold in 1858, in the New York market, averaged 22 cwt. each alive, and one hundred head averaged over 20 cwt. each.

71. **The Haxtun Steer.**—The Haxtun steer was raised by E. Haxtun, in Beekman Township, Dutchess Co., N. Y. He was out of a cow bought from a drove that came from near Cleveland, Ohio, which was probably three fourths Durham, and a full-bred short-horn bull, of Mr. Sheaf's (Dutchess County) importation. The steer was called $\frac{15}{16}$ths Durham, part of the blood appearing to indicate a descent from the long-horn of the old Kentucky importation. His color was nearly all red, having some whitish roan spots, and he was, notwithstanding his great size and fatness, one of the handsomest-formed fat bullocks we have ever seen, and as firm on his legs almost as he ever was, and was in appearance as fresh and healthy as ever, taking his rations regularly. His feed was 14 quarts a day of meal, made of two parts Indian corn and one part oats, and as much hay as he would eat. His feeding commenced in the fall, after he was four years old, and he was seven years old the spring before he was killed. His weight at home, Dec. 1, 1859, was

3,472 lbs. He was probably weighed full at that time; but after a railroad passage of 75 miles, he was weighed here, Jan. 9, 1860, before he was filled up with food and water, and his fair, honest weight, as given by David Allerton, who weighed him, was 3,452 lbs. Three days afterward, weighed upon the same scales, by the same man, with scales carefully balanced, he weighed 3,418 lbs. Afterward, upon two other scales, his weight was 3,419. He was sold Jan. 10, 1860, to Wm. Lalor, of Centre Market, for $850; and was slaughtered and dressed at Patterson's slaughter-house, Jan. 19, by the same man who dressed the Washington, and hung until Jan. 26, when the quarters were weighed, under the careful supervision of Barney Bartram, John Harris, John M. Seaman, and James L. Stewart, and in the presence of a large company of lookers-on, many of whom were considerably interested, having invested largely in the way of bets upon the net weight.

The following was the result: fore quarters, 700 and 668 lbs.—1,368 lbs.; the hind quarters, 482 and 469 lbs.—951 lbs.; total, 2,319 lbs. This was $2\frac{2}{3}$ lbs. over $67\frac{3}{4}$ lbs. per cwt. of the last live weight. The shrinkage was estimated at 50 lbs.; but he was hung just the same length of time as the Washington, and, like him, has had his hide stuffed and form preserved, being, up to that time, the largest bullock ever brought to New York. The fatting of this steer has been one of the most perfectly successful experiments to produce a monstrous animal, so evenly formed and faultlessly shaped, that no one could say where he could be improved.

72. **Other Large Bullocks.**—A pair of oxen, called the "Cayuga Prize Oxen," was also sold in the New York market, the same week, for $700, which was considered remarkable; their live weight, however, was 2,865 lbs. each; they were six years old.

The *Michigan Farmer* of Jan. 20, 1860, says: "We lately gave an account of several fat cattle which were killed in this city on the week before the New Year. The pair weighed 6,437 lbs., or 3,218 lbs. each. The net weight was estimated at 68 lbs. per cwt." Of some others the *Farmer* said: "The actual yield of the cattle killed by William Smith, in this market, was 66 lbs. to the 100 lbs. of live weight, or 2,150 lbs. from 3,218 lbs. It will be seen by this, therefore, how those great oxen killed in the Detroit market approximated to what is considered the largest and fattest animal ever killed in the United States."

We have a letter before us from Isaac Hubbard, of Claremont, N. H., who is ninety years old, but not too old to read with interest the accounts of these fat bullocks. He says that, seeing an account of the Haxtun steer, which interested him very much, induced him to give the history of a fat bullock fed by him twenty odd years ago.

The calf was dropped Jan. 4, 1832, and was then estimated to weigh 100 lbs.; Jan. 4, 1833, he weighed 874 lbs.; Dec. 3, 1833, 1,280 lbs.; Jan. 5, 1835, 1,800 lbs.; Dec. 26, 1835, 2,350 lbs.; Feb. 15, 1837, 2,910 lbs.

In Oct., 1838, Mr. H. sold him, and he was conveyed to Hartford, Conn., and weighed 3,370 lbs. This steer was bought by Paran Stevens, since of great hotel notoriety, and was extensively exhibited in this country as "the largest ox ever seen." Perhaps some persons in this State may remember the exhibition of this mammoth ox.

In 1840, this great show animal was sent to England for exhibition there, and, it is said, attracted much attention. From there he was taken to France and Belgium, and exhibited as the great bullock of the world. He was brought back to England and slaughtered, but his weight at the time, either alive or dead, was not published, but it was less in this country than that of several whose weights we have published. This is one of the great show bullocks which have been exhibited and advertised as weighing over 4,000 lbs., a weight that never has, so far as we have any satisfactory records, yet been attained; and although we believe that 4,000 lbs. is above the limit that can be attained by one of the bovine race, we would not discourage the efforts of those who have made noble attempts to improve this class of livestock, both in form and quality, and who will not be content until the utmost possible limit of weight is accomplished.

The name of Mr. Hubbard's steer was "Olympus," in this country, but in Europe he was exhibited under the name of "Brother Jonathan." He was of the "native stock," common in New Hampshire; his color a dapple-bay or red, a little changeable in the sun, with white spots on the face and legs.

It is not, however, generally profitable to feed such great bullocks as we have noticed; but, to see what has been done, it will always be an interesting matter of reference. So will be the matter we shall give in the next section.

SECTION V.—STATISTICS OF THE NEW YORK CATTLE MARKET.

Numbers of Butchers' Animals Annually Sold in New York. — Farmers are very justly accused of a neglect of statistical information in relation to the business upon which all their prosperity depends. In the very important matter of furnishing the cities with bullocks, the producers had no means of forming estimates of the needed supply, until we instituted reports of the cattle markets of all the principal cities, and particularly the city of New York, which is an enormous consumer of fresh beef. To this market we have devoted many years, attending almost every weekly market, and have given the farmers statistical tables of immense value to them. We now embody some of this useful statistical information, where it can stand as a table of permanent reference; and we earnestly commend it to all who are engaged in agricultural pursuits.

ANNUAL RECEIPTS FOR TEN YEARS—1854–1863.

Years.	Beeves.	Cows.	Calves.	Sheep.	Swine.	Ann. Totals.
1854	169,864	13,131	68,584	555,479	252,328	1,059,386
1855	185,564	12,110	47,969	588,741	318,107	1,152,491
1856	187,057	12,857	43,081	462,739	345,911	1,051,645
1857	162,243	12,840	34,218	444,036	288,984	942,321
1858	191,874	10,128	37,675	447,445	551,479	1,238,601
1859	205,272	9,492	48,769	404,894	399,665	1,068,092
1860	226,933	7,144	39,436	518,750	323,918	1,116,181
1861	222,835	5,749	32,868	512,366	559,421	1,333,239
1862	239,486	5,378	30,465	484,342	1,148,209	1,907,880
1863	264,091	6,470	35,709	519,316	1,101,617	1,927,203
Total	2,055,219	95,299	418,774	4,938,108	5,289,639	12,797,039
Av. pr. year	205,522	9,530	41,877	493,811	528,964	1,279,704

WEEKLY AVERAGE OF ALL ANIMALS FOR TEN YEARS—1854–1863.

Years.	Beeves.	Cows.	Calves.	Sheep.	Swine.	Total.
1854	3,257	253	1,315	10,682	4,852	20,359
1855	3,565	233	922	11,322	6,117	22,069
1856	3,597	247	828	8,898	6,650	20,224
1857	3,120	245	658	8,539	5,557	18,119
1858	3,680	195	724	8,604	10,605	28,809
1859	3,947	182	841	9,709	7,686	22,365
1860	4,364	139	758	9,976	7,229	21,465
1861	4,285	110	632	9,853	10,758	25,637
1862	4,518	101	574	9,138	21,664	36,000
1863	5,079	125	687	9,987	21,185	37,062

The increase of bullocks in this decade is 55 per cent. Cows have fallen off more than half, and calves nearly the same. The supply of sheep remains nearly stationary, but swine have increased enormously. The following is the estimated number of pounds of meat, derived from slaughtered animals in 1863, and the wholesale value. In the estimate, cows are added to the bullocks, because the most of them, eventually, go to the butcher.

Beeves—270,561, av. 700 lbs. net	189,392,700 lbs.	at 9¼c. per lb. net	$17,513,824 75
Veal—35,709 calves at 75 lbs.	2,678,175 "	at 10c. per lb. net	267,817 50
Sheep and lambs—519,316, at 42 lbs.	21,811,272 "	at 10c. per lb. net	2,181,127 20
Swine—1,101,617, at 150 lbs.	165,242,550 "	at 6½c. per lb. net	10,740,765 75
Total	379,124,697 lbs.		$30,708,535 20

It is also very important for farmers to know where the supply comes from. Of 210,384 bullocks sold in 1863, the six following States furnished the respective numbers, viz.: Illinois, 118,692; New York, 28,985; Ohio, 19,269; Indiana, 14,232; Michigan, 9,074; Kentucky, 6,782. As the same proportion holds good for all the cattle received in New York, it will be seen that Illinois furnishes 56½ per cent. True, a good many credited to that State come from Iowa, Missouri, and other States.

The proportion of hogs from Illinois is probably greater than upon beef cattle. The great bulk of pork from the hogs slaughtered here is packed and sent to other places for consumption; large quantities of it to Europe. A small portion of the beef is packed and sent abroad. The great bulk of it, and all the veal and nearly all of the sheep, and a vast quantity besides that comes in ready dressed from the country, goes to furnish fresh meat to the cities of New York and Brooklyn, three small cities in New Jersey, and several towns within fifty miles, ships in port, and most of our armed ships and forts and soldiers on the coast between Hampton Roads and Key West.

Estimated average price of beef cattle per net pound each year, 1854–63: 1854, 9 cents full; 1855, 10 cents; 1856, $9\frac{1}{2}$ cents nearly; 1857, $10\frac{1}{2}$ cents nearly; 1858, $8\frac{1}{2}$ cents nearly; 1859, 9 cents; 1860, 8 cents full; 1861, $7\frac{3}{4}$ cents; 1862, $7\frac{2}{3}$ cents; 1863, $9\frac{1}{4}$ cents. Up to March, 1864, prices have ranged from 9 to 16 cents a pound net, which was higher than before since 1857.

During 1863, the live-weight price of corn-fed hogs ranged from 4 to 7 cents per pound. In February, 1864, it reached $8\frac{1}{2}$ and 9 cents per pound, which was the highest price for Western stock ever attained.

That all who read this page may see what an immense interest is involved in the live-stock trade of the country with New York city, we add the following calculation of number of pounds of meat and estimated value:

CONSUMPTION OF TEN YEARS—1854–1863.

Beeves—2,160,518 head av. 700 lbs. net...	1,505,362,600 lbs.	at 9 cents per lb. net..	$135,482,634
Calves—418,774 head av. 75 lbs. net......	31,408,050 "	at 10 cents per lb. net..	3,140,805
Sheep and lambs—4,938,108 head av. 42 lbs.	207,390,536 "	at 10 cents per lb. net..	20,739,053
Swine—5,289,639 head av. 125 lbs........	661,204,800 "	at 6 cents per lb. net..	39,672,288
Total......................	2,406,365,986 lbs.	....	$199,034,780
Average per annum for the ten years....	240,536,598 "	....	19,903,478

Farmers, look at these figures. They teach you an important lesson; one well worthy of being placed upon this permanent record, to remind you and your children of the great importance of the live-stock interest of the country. You see by the tables the rapid increase of the trade, and the enormous sum that it amounts to in ten years. Lest you should be confused by the sum in numerical figures, let us repeat it in words. Two billions four hundred and five millions three hundred and sixty-five thousand nine hundred and eighty-six pounds of meat, amounting to one hundred and ninety-nine millions thirty-four thousand seven hundred and eighty dollars. This is the sum that New York city has disbursed to the farming interest for ten years' supply of meat, derived from the slaughter of twelve millions seven hundred and ninety-seven thousand and thirty-nine animals.

These statistics enable us to realize the vast resources of America. The country is now feeding a million of men in the army, fighting for freedom, full rations of meat, and sending nearly two millions a year of animals to the city shambles of New York, for which the city is sending back to the country twenty millions of dollars.

This is the greatest meat-eating country in the world; it produces all that it consumes and a great surplus to send abroad.

74. **Cattle Transportation.**—Nearly all the stock sold in the New York market is transported upon railway cars. We assume that the beeves for ten years' supply have paid a tariff of $10 a head average to railroads, making the sum of $21,505,180; calves at fifty cents a head, $209,387; sheep at seventy-five cents, $3,703,681; hogs at $1 25 each, $6,612,048. Total $32,030,296, as the estimated amount paid for the transportation of animals butchered in New York for ten years.

Improvement is needed in transportation. Animals are forced to stand without food or water two or three days, or as long as their tired legs will sustain them, and when they fail, as sometimes they do, the fainting creature falls and is trampled to death.

We must have an improvement in cattle-cars. It certainly would not be difficult to construct them so that cattle should stand with heads to one side, where water could be given them in a trough by means of hose; and if this can not be done, it must be made a criminal offense to keep the animals on a car more than 30 hours without water. In fact, it would be better for all parties if the number were limited that a car should contain, and that in no case should the stock remain on the cars over 30 hours, without being unloaded, rested, fed, and watered. The present practice is a loss to owners and an injury to consumers, by making the beasts feverish and unhealthy, besides being an outrageous act of cruelty to animals. The whole community is interested, and should cry out against the wicked practice, which is enough to make humanity shudder.

75. **Comparative Measurements of Cattle.**—Inquiries are often made in regard to the relative size of different breeds of cattle. It is not easy to give a very definite answer to questions of this kind; but as several of the leading breeds of this country were derived from England, where they are bred in greater numbers than they are here, an idea of their comparative size may be had from certain measurements taken of prize animals at the English shows. We give the following tables in reference to Short-horns, Herefords, and Devons, which took prizes at the shows of the Royal Agricultural Society, in 1858 and 1859. The first was prepared for the Society by Mr. Robert Smith.

CLASS.	Average Age.		Average Girth.	
SHORT HORNS.	yrs.	mos.	ft.	in.
Aged bulls	4	7¼	8	3½
Yearling bulls	1	9½	7	2
Bull calves		9¼	5	8
Cows	3	9	7	10
Two-year-old heifers	2	5	7	4½
Yearlings	1	4	6	5½
HEREFORDS.				
Aged bulls	4	5	8	3
Yearling bulls	1	10¼	7	0½
Bull calves		10¾	5	11½

CLASS.	Average Age.		Average Girth.	
HEREFORDS.	yrs.	mos.	ft.	in.
Cows	7	8	7	2
Two-year-old heifers	2	7¼	7	4½
Yearlings	1	9½	6	6½
DEVONS.				
Aged bulls	3	6	7	5
Yearling bulls	1	6¼	6	2
Bull calves		8¼	5	2
Cows	6	2¼	6	9¾
Two-year-old heifers	2	6	6	10
Yearlings	1	7¾	6	1

The next table was furnished by Mr. Thos. Duckham, the editor of the "Herd-Book of Hereford Cattle." As far as it goes, it comprises measurements of Short-horns and Herefords, which received prizes at the Warwick show that year, the rank of the awards having been according to the order observed in the table.

CLASS.	Average Age.		Average Girth.	
SHORT-HORNS.	yrs.	mos.	ft.	in.
Aged bulls	4	0	8	6
"	4	3	8	6
"	2	7	7	7½
Yearling bulls	1	10	7	7
"	1	8	7	2
"	1	11	7	4
Bull calves		9	5	9½
"		10	5	10½
Cows	4	3	8	0

CLASS.	Average Age.		Average Girth.	
HEREFORDS.	yrs.	mos.	ft.	in.
Aged bulls	2	10	8	5
"	4	6	8	7
"	2	10	8	0
Yearling bulls	1	9	7	3
"	1	11	7	5
"	1	9	7	1
Bull calves		11	6	2
"		11	6	1½
Cows	3	7	8	1

76. **The Improvement in Breeds and Weights of Cattle.**—What has raised the average weight of beef cattle from 500 to 800 lbs., and some individuals up to 3,600 lbs.? What has raised the crops of corn to doublê their former yield, and in several instances produced over 190 bushels of corn to the acre —that was in Kentucky; but in the State of New York whole fields have averaged 100 bushels. In Connecticut, 134 bushels of ears of corn have been produced upon half an acre, at an expense for culture and harvest of less than $3. What has induced men to root up old orchards of natural fruit, "five to the pint," and plant pippins, baldwins, greenings, russets, etc., some of which have been sold from $8 to $20 a barrel, and retailed at a guinea a dozen? What has induced ingenious men to devote the best energies of their minds to inventing plows, harrows, drills, reaping-machines, and every other implement of husbandry, while every class of domestic animals has also been improved—neat cattle probably the most of all?

The answer is, the publication of just such facts as we are now giving, which tend to show what has been done by some men, and may be done by others. This encourages us to continue our labor.

SECTION VI.—FEEDING CATTLE AND CARE OF FARM-STOCK.

Selecting Calves for Rearing.—Use judgment in selecting such heifer calves as are to be reared. Select only those whose mothers are good milkers, and whose sires have come from good milking stock; at the same time, the calf itself should have those characteristics that indicate an aptitude to develop good milking qualities, viz.: small, fine head, rather long in the muzzle; bright eyes; thin, tapering neck; small, well-shaped legs; long body; large hind quarters, set wide behind; soft skin; fine hair—the color of which is immaterial; and, above all, the milk-mirror or udder-veins should be large and well developed.

The raising of bull calves for breeders had better be left to those who have time and means to devote their attention to it, who procure the best animals to begin with. It would be no loss to the country, were the numerous specimens of scrub bulls, too often seen, condemned to perpetual exile.

But there is no reason why a portion of the male calves, at least, should not be reared as bullocks, either for the team or the butcher; and it is important that such as are reserved for this purpose should possess certain points indicative of future excellence, viz.: well-shaped head; small ears; short, thick neck; deep brisket; broad chest and shoulders; fine bone; long body, well rounded behind the shoulders; straight back; wide loins; full quarters; tail thin and tapering; skin soft, and not too thin.

It is too often the case that animals are selected for rearing from being of pretty color—that takes the fancy of some member of the family—or the calf of some pet cow of the dairy-maid, without attention being paid to its promise of excellences. Not unfrequently valuable calves are fattened for veal, simply because their color is unpleasing to the eye.

This is about the most important branch of the stock-raiser's business. Too many persons pursue the careless mode of the person who wrote the following item:

"In the spring of 1858 my two cows had bull calves, which I determined to raise for sale, and so gave them a good chance to grow, adding an extra in the shape of a handful of barley meal, with their feeds of milk. They grew finely, or rather Bobby did, for Billy, taking a sudden dislike to sour milk, had rather slim rations for the last six weeks before weaning. I told him he might starve if he liked, and took no special pains to humor his fancies. In September I had an offer of $6 for Bobby, and concluded to let him go, but the buyer was behind time about two weeks, and thought the additional keeping worth nothing, so I did not turn him off. So, of course, Bobby was kept, and grew up to propagate the race of Bob calves."

78. **Calves—Give them Shelter.**—It is almost impossible to winter calves without shelter; if they survive the winter, they are mere skeletons, and have to be lifted up before spring, and never make anything but poor, raw-boned, unprofitable stock. Sheep are many times allowed to pick up what they can get for half the winter; but the dead lambs, and probably dead sheep, that lie scattered over the fields, tell the profit of such a course. When protected, all food not required to maintain the natural waste of the system goes toward increasing the growth of the animal. To obtain perfect form, animals should be kept continually growing until they arrive at maturity. They are often turned out in the spring so poor that it requires half the summer to make them as good as they were the fall before—a loss of three quarters of the year in the growth of the animal. A grazier lately said to us, in speaking of such a lot of cattle that he bought, "It took the whole summer to soak their hides loose, so that they could begin to grow. They seemed as hard and dry as a pair of old boots, and in some spots as destitute of hair."

79. **Training Steers.**—At the Maine State Fair, a boy of fifteen years, from the town of Woodstock, had a pair of three-year-old steers, which obeyed him as an obedient boy will his parents. By a motion of his hand they would go forward, halt, and return, go to the right or left, kneel down, and perform other things, much to the surprise of some older farmers, who are in the habit of putting the brad through the hide. At a New York State Fair there was a perfect Rarey of an ox-tamer, who practices breaking steers for farmers, and as he never treats them inhumanly, he soon has them under perfect control, and as bidable as well-trained children.

80. **Unruly Animals.**—As a general rule, our domestic animals are never unruly, except when taught to be so. For instance, some persons, in turning stock from one field to another, only let down a few of the top rails or bars, and force the animals to jump over. Too lazy to put up as well as to let down, they leave the gap half closed, as a temptation to the stock to jump back again. A few practical lessons of this kind make stock unruly. Carelessness in regard to putting up fences when thrown down, or in repairing weak spots, confirms the habit. A writer says his practice has always been to teach his cows, calves, sheep, and hogs to go through or under, rather than over, the bars or fences, always leaving a rail or bar up at the top. Taught this way, they never think of jumping, and he has never been troubled with unruly animals, even when his fences were low.

81. **Kindness to Brutes.**—No man can afford to be unkind to his domestic animals, because animals which are treated the most kindly are the most gentle and obedient, and also thrive the best; hence, no one can *afford* to use them unkindly. By kindness, mingled with firmness, the most ferocious animals are subdued, and it is vain to suppose that the same means would not be effectual in training domestic animals. Surely, no one should degrade himself by continuing a practice which is both unprofitable and inhuman—a practice that makes man the brute instead of the quadruped. There is no economy in half starving any stock through the winter, and causing them to take all the storms without any shelter; but, on the contrary, it is a clear waste and loss to the owner.

82. **Shelter for Cattle.**—Next to the necessity of an adequate supply of food for stock, comes the *importance* of shelter. It needs no argument to prove the truism that animals can not live without food; and it is just as certain that our domestic stock, artificially susceptible to the storms and changes of our Northern climate, can not *thrive* without proper shelter. It seems now to be well settled, that a due degree of warmth is equivalent, in a measure, to food; and we all know that an entire *abandon* to ease and comfort, while in a state of rest—a perfect freedom from apprehension of any kind, which may arise from a lack of food, or from exposure, or any other cause—is necessary to the maximum of thrift or usefulness.

On old, improved, rich lands, it would be policy in the farmer to stable or yard his cattle and horses during the whole year; but I should prefer yarding in the summer season, as more air and room for exercise would be allowed, both of which would be conducive to the health of the animals.

One acre of land, in good condition, sown to corn, and cut and fed from the time it begins to tassel until it begins to glaze, will keep six head of cattle during the time, and perhaps more—say two months—while it would have taken six acres of pasture to keep them the same length of time.

On farms where the pasture is generally the roughest, poorest part of the farm, and that which could not be applied as profitably to other purposes—on such lands the cattle must be allowed to get their own living in summer.

The above are excerpta from several excellent essays in the *Genesee*

Farmer, and might have been much more extended, only that we have a great many other good things to glean from other sources.

83. **Straw for Cattle.**—Mr. Johnson says, in a letter to the *Genesee Farmer:* "You say that I put straw in my boxes for my cows. This is not so. No man ever saw me feed straw to cattle, at least for the last twenty-five years. If they choose, they can eat the straw spread out for litter, but I never compel them to eat straw. I know cattle can be fatted on grain and straw, but I don't think so profitably as part grain and part hay, or part oil-cake and part hay. Grass is the natural food of sheep and cattle; and hay made from grass, if properly made, puts on fat, even if very little else is fed. I am satisfied that either cows or fatting cattle do much better in yards, with ample sheds and plenty of straw for clean, dry beds. I can not feed any kind of stock profitably unless they have such beds."

84. **Wintering Cattle.**—There is yet a good deal of wisdom to be learned upon this subject, even by those whose talk is of bullocks, and particularly in wintering calves. The one great error is in neglecting them in autumn, after the frost has destroyed the sweetness of the grass, and allowing them to commence getting poor before winter feeding is commenced. There is no error more fatal to success than such neglect. It is often the foundation of disease that the animal never recovers from. There is no condition so good for an animal going into winter quarters as a thriving fatness; and if that can be kept up till mid-winter, the danger of starvation upon very light feed in the spring is greatly diminished. It is one of the worst things in all farm economy to neglect feeding stock in the fall, because it is not yet time to begin to fodder. You had better begin in July, if your pasture fails, so that your animals begin to lose flesh. All that is saved of fodder in the fall, upon the plea that "cattle can shift a while longer," exactly verifies the old saw about "saving at the spigot and wasting at the bung."

85. **Feeding Pumpkins.**—A subscriber sends a long communication against feeding pumpkins to cows. The writer's reasoning is not entirely sound, and does not agree with our own experience and observation. As a general rule, we are quite sure that pumpkins increase rather than diminish the quantity of milk; and instead of making neat stock grow poor, we have fattened large numbers of cattle on pumpkins alone. There is one suggestion in our correspondent's letter, however, which may be worthy of attention. He refers to the fact that the seeds of pumpkins have a decided *diuretic* (urine-producing) effect upon the human organs, and that if they have the same effect upon cows, the excessive flow of urine must necessarily reduce the flow of the milky fluid. He advises that when pumpkins are fed, the seeds should be taken out. The idea is plausible, and worth being acted on.

86. **Keeping Stock Warm, and Variety of Food.**—Man craves a variety of food; that is, a variety of substances, either one of which would sustain life, but would not be satisfactory. Nature demands the variation, and the mixing together the several substances. Why? Simply because no one will give all the elements that go to make up the animal economy. One article

furnishes phosphate for bones, which another article is destitute of, yet it may contain matter that will clothe the bones with muscle. Food that contains neither fat nor sugar will be found sufficient to keep up the animal heat. Food that contained all the elements of bone, muscle, fiber, fat, and heat-producing qualities, might be so concentrated as to be unhealthy.

A man fed upon pemmican, would have a disposition to eat straw, husks, and twigs, or gnaw the bark from trees, to get something to distend the stomach and enable it to perform its functions healthily. Let this be thought of in feeding domestic animals. It will furnish an easy rule for your guidance. Judge them by yourself, and act accordingly; you will find it an easy and sure road to success. We do not for animals, quadruped or biped, recommend a variety of food at the same meal—only a change from time to time, so as to give variety, and consequently all the elements necessary to produce growth.

Never neglect to give your cattle water until you learn to do without it yourself, and never offer them drink where you would vomit if compelled to slake your own thirst.

Never leave a horse, a cow, a sheep, out in a cold winter storm, until you arrive at that condition of unfeelingness that you could endure it yourself. When you think you could find comfortable shelter under a common rail fence, you may leave your cattle there. No domestic animal can ever reach the highest state of perfection its nature is capable of unless always kept in a healthy, growing condition, in an equable climate, or in warm shelter if the inhabitant of a cold one.

Farmers do not pay sufficient attention to the warmth of their stock, but suffer them to roam about in the open air, exposed to the inclement weather. The amount of exercise is another most important point to attend to. The more an animal moves about, the quicker it will breathe, and the more starch, gum, sugar, fat, and other respiratory elements it must have in its food; and if an additional quantity of these substances be not given to supply the increased demand, the fat and other parts of the body will be drawn upon, and the animal will become thinner; also, as before observed, every motion of the body produces a corresponding destruction of the muscles which produce that motion. It is therefore quite evident that the more the animal moves about, the more of the heat-producing and flesh-forming principle it must receive in its food. Hence we see the propriety of keeping our cattle in sheds and yards, and not suffering those (particularly which we intend to fatten) to rove about, consuming more food, and wasting away more rapidly the various tissues of the body already formed, and making it more expensive and difficult to fatten them.

87. **Fattening Cattle upon Hay.**—Speaking upon this subject, a committee of the Massachusetts Board of Agriculture, of which John Brooks and Paoli Lathrop are members, remark:

"Fattening cattle in winter upon hay alone is a resort of many farmers, and where hay is plenty and distant from market, the practice is not inconsistent with economy. If well attended, good animals consuming four per cent. of their live weight of good hay daily, will gain daily two pounds of flesh. Suppose the flesh gained to be worth 16 cents, it will be equal to $8 a ton for the hay. The better practice, however, is to give only three per cent. of the live weight of the animal in hay daily, and an equivalent for the other one per cent. in Indian meal or roots. The gain would be greater for the same cost of food."

Another remark worth quoting is the following:

"The best age for feeding cattle for beef is from four to eight years. Young growing cattle may be fattened, but it will require more food in proportion, and longer time."

88. **How to Feed Roots.**—There seems to be much diversity of opinion as to the value of turnips, carrots, etc., for feeding. One man feeds his hogs a great amount of them, but neglects to provide a bed secure from the intrusion of cold winds and snow, and then wonders they do not grow; or feeds a cow four bushels per day, and wonders she does not fat. How could she? She is almost physicked to death, and her urinary organs are injured by over-exertion; and although she is thoroughly littered with straw, still her feet are in the water; and when she lies down, her side is wet.

After many trials in a similar way, many have come to the conclusion that root feeding is an unprofitable business in our climate. If hogs must sleep in snow-banks, give them corn by all means, and give them plenty of it. If cattle can not be stabled, or kept so sheltered that they may be dry, then roots will not give one half the return they would under a judicious system of management.

After many trials of fattening sheep and horned cattle, and feeding store stock of all kinds with roots, I came to the conclusion that they are all valuable when properly fed with hay and grain, but that their relative value to grain is often overrated in this country of cheap corn. Roots, unless cooked, are not economical food for swine.

The great error in relation to feeding roots is, that they are too much fed to the exclusion of grain. A farmer has shoats to winter, or horned cattle to fatten; he first feeds his turnips, carrots, beets, small potatoes; next his corn or meal. This is wrong. The corn should be fed from the first. A dozen shoats of 100 lbs. each would profitably receive a bushel per day of roots, if cooked with corn. A fattening ox should have one bushel, or not over two, per day, with six or eight quarts of meal. Cows should have one half bushel per day, whether being milked or not. That amount will bring them out, in the spring, fat and ready to do good service at the pail, provided, of course, that they have hay and stalks in due proportion. Calves and yearlings should always have one fourth bushel per day, with a very small allowance of grain.

The above is partly from the *Stock Journal*, and the following from the *Working Farmer;* both of which are good authority.

We beg again to remind our readers, particularly those who are engaged in dairy and stock farming, to appropriate a full amount of land to root-growing. Carrots, beets, turnips, parsneps, may all be raised with profit wherever stock is to be fed. For horses, carrots are invaluable. For milch cows, they not only furnish a milk of superior flavor, butter of fine color and odor, but, when used as a portion of their food, they guarantee a healthful condition. The power of the pectic acid of the carrot to gelatinize all vegetable matter held in solution in the stomach, puts its contents in such a condition that the peristaltic motion of the intestines can manage it. Flatulence is prevented, and thorough digestion secured. The dung of the horse fed partly on carrots, never contains the undecomposed shell of the oat, nor large amounts of starch unappropriated ; and it is for this reason that a bushel of oats and a bushel of carrots will do more for the horse than two bushels of oats ; and not because the carrot contains as much flesh-making material as the oat, but because it causes all the flesh-making material of the oat to be appropriated, instead of being voided with the excretia. For cows and oxen, other roots may occasionally be substituted with profit, as variety to all animals is pleasing in their food ; and no one root should be so continuously used. Since the introduction of pulping machines, pulped roots mixed with cut hay, cut straw, and other cheap material, add much to the economy of the farm as well as to the health of the cattle.

89. **Feeding Linseed and Cotton-seed Oil-Cake.**—Never having had personal experience enough in feeding oil-cake, having always preferred corn-meal, to give an opinion which we would ask others to rely upon, we select the following from a lecture by Prof. Voelcker, before the meeting of the council of the Royal Agricultural Society of England, in June, 1860. It is worthy of attention from all cattle-feeders. He says :

" It is not my object, in giving a practical turn to the lecture to-day, to record any experiments of my own, or in any way to presume to teach the feeder of stock in what way he may best expend his money in the purchase of food, but I shall endeavor simply to give to the practical man some indications whereby I hope he will be enabled to form for himself a trustworthy opinion respecting the relative value of different cakes, and likewise what is perhaps of more importance to him, to introduce some remarks which will enable him to distinguish a good from a bad cake ; and in conclusion, shall allude briefly to the various substances with which oil-cakes are at the present time often largely adulterated.

90. **Fat in Food.**—" Let me first point out to you some peculiarities in the composition of oil-cakes. A reference to their composition is necessary to the understanding the remarks which will follow. I would then observe, that what characterizes oil-cakes, distinguishing them from all other articles of food pre-eminently, is the large amount of oil that is left in the cakes, obtained by expression of the oil-seeds. If you glance at the diagram (see table on page 71), you will find that they contain a considerable quantity of oil—from 6 to 12 per cent. ; and in some instances, as in the decorticated cotton-cake, even 16 per cent. of oil. I may observe at once that the value

of oil-cake in a very great measure depends upon the amount of oil which is left in the cake. And I may further say, that the tendency of the manufacturer at the present day is to produce an inferior description of cake, inas much as improved machinery enables him to squeeze out more oil than formerly, and thus to render the refuse less fattening, less valuable to the feeder of stock. I am very much inclined to believe that the oil is by far the most valuable constituent of all oil-cakes. I am aware that it was the fashion, not many years ago, to measure the feeding properties and even the fattening qualities of articles of food by the amount of nitrogenous or flesh-forming matters; but these views are not supported by any practical experiments, nor, indeed, by the every-day experience that we have respecting not only human, but cattle food. We pay more for food rich in starch, mucilage, and matters capable of producing fat, than we pay for food which, like bean-meal, is extremely rich in nitrogenous matter, but which does not produce so much butchers' meat. It is a matter of much importance to the farmer to know how much he gets back for the money he expends in the purchase of food. I have no hesitation in saying that more money is made by the purchase of food rich in oil, starch, or sugar, than in the purchase of food which contains an excess of nitrogenous matters.

91. **Flesh in Food.**—"Still, we ought not to leave unnoticed that the flesh-forming matters are very important indeed, and that oil-cakes are peculiarly rich in them. In one sense they are perhaps most essential—perhaps even more essentially necessary than the other constituents of food which produce fat, or are employed in the animal economy to keep up the animal heat. They are more important in this sense; whereas the animal organization has the power to make fat from gum, sugar, mucilage, and even from young cellulose or young vegetable fiber, it has not the power of making a particle of flesh. Unless, therefore, food is given to animals which contains ready-made flesh, an animal can not grow, and the other constituents of food remain unavailable. It is in this sense that the nitrogenous matters of food are extremely valuable; but in a purely practical sense they are not so valuable as the oil, starch, or sugar of food, because by spending a certain amount of money in food, we do not get so great a return in the shape of butchers' meat by purchasing these flesh-forming matters as by purchasing feeding substances rich in oil or starch. However, in speaking of the relative value of the various constituents, especially the oily and the flesh-forming constituents, we are not to overlook that the quantity of nitrogenous matter which is not applied for the formation of flesh, passes through the animal, and is obtained again in the dung, with the exception of a small quantity that escapes by evaporation through the skin or through the lungs. A certain quantity of nitrogenous food evaporates through the skin, or with the perspiration; but by far the largest proportion, according to some experiments, nineteen twentieths, of the flesh-forming or nitrogenous matters of food are found again in the dung; according to others the amount is seven eighths. But, speaking in round numbers, I think we are not far wrong in saying that

we may fairly expect three fourths of the nitrogenized matters of oil-cake back again in the manure; and perhaps we are safe, likewise, in asserting that fully one half of the money value of rape and the best cotton cakes is obtained back again in the manure. So we must not put down these constituents, which are called nitrogenous, as useless, because they alone do not produce much butchers' meat; nor must we estimate the value of oil-cake entirely by the increase in the live weight of cattle fed upon the cake, but also, and chiefly, I believe, by the increased value of the manure which is produced through the instrumentality of oil-cake.

92. **Bone in Food.**—" I will now direct attention to the inorganic matters or ash of oil-cakes. These inorganic matters may be called bone material; for the ash of oil-cakes is particularly rich in phosphates of lime, or the material of which the greater part of the bone is composed. Now, the large proportion of oil; next, the large proportion of flesh-forming matters; and third, a considerable proportion of bone material are characteristics that confer a particular value upon oil-cake, either directly as food, or indirectly as useful material for increasing the value of farm-yard manure. For let me observe, that oily matters and substances that make butchers' meat are the most valuable constituents in all feeding materials, and therefore also in an oil-cake. On the other hand, the flesh-forming constituents and the bone-forming materials—in other words, the nitrogen and the phosphates of the cake—are the two most valuable fertilizing constituents. We have thus in oil-cakes, in a concentrated state, materials that produce butchers' meat, and, at the same time, yield the most valuable fertilizing constituents. There is no other description of food which unites these useful properties.

93. **Linseed-Cake.**—" You are all aware we distinguish chiefly the following kinds of linseed-cake: English cake, American cake, and foreign cakes. Among foreign cakes there are various descriptions. There is the Baltic, the Marseilles, the Naples cake, and various others. We have here an excellent specimen of good English cake. The English cake is made now of two qualities, thick and thin cake; the latter is made in imitation of the American barrel cake, of which specimens are before you. You observe how closely the thin English cake resembles the American barrel cake. The latter has gained much favor, and therefore the manufacturers in England have found it to their advantage to imitate the form in which it is sold. In the first place, notice that the American cake occasionally is as bad as English and foreign cakes. It is not every description of American cake which is good, but generally speaking, as it comes into the market, especially the barrel cake, it is of a very superior character. But the question whether it is generally superior to the English cake or not, is one which is not very readily decided; you may get English cake quite as good, if not better, than the American cake.

" Some years ago it was the fashion to buy the English cake in preference to any other, but it is now the fashion to buy the American barrel cake. I can only account for this by the fact that the English cake, being produced in good quality, was rapidly consumed; the American cake was usually sent in a very damaged condition to this country, coming as it did in bags; our sharp American friends very soon found that they must send their cake here in a good condition. They dried it previously to sending it over, and imported it in barrels, and this improved condition of the American cake greatly increased its reputation, which has been kept up; so that at the present time in most markets, American cake, especially the barrel cake, fetches a higher price than the English. But a reference to the diagram will show you that there is no essential difference between good English cake and good American; indeed, if anything, the advantage is in favor of the specimens of English cake. The difference is extremely small. There is the same quantity of oil in both cases. The proportion of flesh-forming matters is rather larger in the English than in the American. There is the same amount of ash in both. The proportion of sand hardly amounts to one per cent. in the English cake, and in the American it is only a half per cent. These differences are extremely small and unimportant, so that you may get, and often do get, as good English cake as American. And occasionally, also, you get bad American cakes; but on the whole, the exporters of American cake are very jealous as to the kind of article they send to this country, especially if they go to the expense of packing it in barrels.

94. **Cotton-Cake.**—"We distinguish now principally two kinds of this cake—the one made of the whole seed, and the other of the shelled seed. The difference in the two qualities of cake will at once become intelligible by an examination of the seeds, or the raw materials from which the cakes are made. The decorticated or shelled cake is made of the kernel of the cotton seed; the whole cake, in which we recognize an abundance of the husk, is made of the entire seed; and inasmuch as the cotton seed contains full half its weight, and some descriptions contain as much as 60 per cent. of the hard husk, we must not expect that the cake made of the whole seed should be so valuable as the decorticated cake. There are several specimens of cotton-cake on the table. There is very little value in the husk itself; the difference in the two kinds of cotton-cake, then, arises from the different mode in which they are made. The one, the decorticated cake, is made from the kernel; the other kind is made from the whole seed. The difference in the composition of the two kinds of cake is very great. The decorticated cotton-cake contains 16 per cent. of oil (more than any other description of cake), while the whole-seed cake contains only 6 per cent. The proportion of albuminous or flesh-forming matters in the decorticated cake amounts to 41 per cent.; in the whole-seed cake it is only 23 per cent, or just one half. So with respect to the other constituents, the proportion of woody fiber is very much larger in the whole-seed cake than in the other. The husk in the whole-seed cake for a long time was a great impediment to the general use to which cotton-cake is now applied in this country. I remember when the first cargoes of cotton-cake came into England, before the decorticated cotton-cake was known; trials were made of it, which proved quite unsuc-

cessful. People did not like it at all, and I believe the cotton-cake would never have been extensively used if it had not been for the invention of a very useful machine, patented in America, by means of which the hard husks can be removed from the kernel. The use of this machine gives us a superior oil and a superior cake. The cotton-seed oil made from the kernel alone is a very useful article, and so is the cake, whereas the oil expressed from the whole seed is dark-brown in color, and can not be used except for the commonest purposes for which oil is employed. The difference in the value of the two descriptions of cake is so great, that I almost think two tuns of the oil-cake, made of the whole seed, do not go further than one tun of the best decorticated cotton-seed cake. Moreover, there is a certain danger in using the whole-seed cake. Several cases of so-called poisoning have been brought under my notice within the last year or two. Animals that have freely partaken of the whole-seed cake have died suddenly, and people have imagined that there was something injurious in the husk; but examination has shown that the effect produced is very much like that which is occasionally produced in the case of boys who die from inflammation of the bowels in countries where cherries are very abundant. Being very greedy, and eating the cherries with the stones, they get a stoppage of the bowels, and so die from inflammation. There is nothing poisonous in the husk of the cotton-seed, and when given judiciously, no injury will result; but if animals are supplied with an unlimited quantity of dry food with the whole seed, there is indeed a danger. The hard husk is indigestible, and may roll together in such large masses that inflammation of the bowels will ensue. There is no such danger, however, in the use of decorticated cotton-cake. The decorticated cake occurs of various degrees of quality. And allow me to observe, with respect to all kinds of cake, that not only the composition, but, even in a higher degree, the condition of the cake, determines in a great measure its value. I have here a specimen which you would hardly recognize as of the same description as another specimen also on the table, of a very beautiful character; it is the same kind of cake, only it is in a bad condition. I say, then, the condition of a cake determines everything.

95. **Condition of Cake.**—"Some time ago I was very much gratified in finding what great care Mr. Stratton, of Broad Hinton, a celebrated short-horn breeder, takes in selecting the very best of American barrel cake for his stock. We often forget that animals have appetites as we have, and that they like food in a good condition better than food in a bad one. The composition of two samples of the same food may not vary much, yet the practical effect produced by them may vary exceedingly. There is nothing remarkable in this, for we know that if we get good, wholesome bread, which is one or two days old, we do well upon it; but if it remains in a damp cellar and gets moldy, stale, and moist, it loses its fine flavor, and in this condition may do us harm. So it is with stale, moldy cakes. Animals never do well on very old cakes. In examining, therefore, the different

cakes, we ought to examine particularly their condition. I allude especially to the examination of cotton-cake, because every person has the means of examining its condition with very little trouble. It is not so easy to examine the condition of linseed; it presupposes an extensive acquaintance with various descriptions of linseed-cake. You must have seen a great many samples of cake before you can give a trustworthy opinion. Not so with decorticated cotton-cake. In this the color affords an excellent criterion as to its freshness. The freshest cotton-cake is as yellow as mustard. I hold a piece of cake in my hand, the exterior of which is brown; but if I cut away a portion, you will observe that the interior is bright yellow—very different from the part that has been exposed to the air. This was an excellent cake when we first got it for feeding purposes, and we are feeding it extensively on our farm at Cirencester. When we first had it, it was of a bright yellow color; but you observe how it has since changed. From this we may learn a very useful lesson, that we may take the color as a guide to the condition and age of the cakes. If we are presented with a cake which is as brown as the specimen before me, and if you find on cutting it that the brown color has penetrated deep into the interior, we may at once conclude that it is a stale old cake. The deeper it has penetrated, the older the cake, and the more it has suffered by bad keeping. If it is kept in a damp place, its color and condition are rapidly deteriorated.

COMPOSITION OF LINSEED AND OF OIL CAKES.

	Linseed.	Linseed-cake.	Rape-cake.	Mustard-cake.	Cotton-seed cake made of whole seed.	Poppy-seed cake.
Water	7.50	12.44	10.68	11.90	11.19	11.63
Oil	34.00	12.79	11.10	6.69	9.08	5.75
Flesh-forming matters	24.44	27.69	29.53	23.48	25.16	31.46
Heat-giving constituents	30.73	40.95	40.90	52.14	48.93	38.18
Inorganic matters (ash)	3.33	6.13	7.79	5.79	5.64	12.98
	100.00	100.00	100.00	100 00	100.00	100.00

96. **Salt for Stock.**—A great deal has been written upon the use of salt for animals, and much reasoning employed to prove various positions; but very few *accurate* experiments have been made. Loose and general observations have been the basis for most of the opinions formed. A certain quantity of salt is unquestionably useful; an excess is as certainly hurtful. The proper amount is what we want to have determined. All ordinary food of animals contains more or less salt—as, for example, a tun of barley or oats straw, and of some kinds of hay, contains six pounds of salt; a tun of carrots contains four pounds. We can not, therefore, speak of animals eating *no* salt—they all partake of it, but we wish to know the right quantity.

The *Genesee Farmer*, from which we have frequently extracted useful facts, and to which we are indebted for the next half dozen, says of salt for cattle feeding for the shambles:

"We have had our doubts whether it was good economy to allow animals *feeding for the butcher* the free use of salt. Salt is doubtless conducive to health, favoring the formation of bile, and aiding in carrying effete matter from the system; but there is no reason to suppose that it favors the accumulation of fat. Liebig, indeed, asserts that '*the absence of common salt is favorable to the formation of fat*,' and that the 'fattening of an animal is rendered impossible, when we add to its food an excess of salt, although short of the quantity required to produce a purgative effect.' Recently, however, in allusion to experiments made since the publication of the work in which the above sentences occur, Liebig says: 'Salt does not act as a producer of flesh; but it neutralizes the injurious actions of the conditions which must be united in the unnatural state of animals fed or fattened in order to produce flesh; and the *advantages attending its use* can hardly be estimated too highly.'

"Boussingault is also in favor of salt. Two lots of steers were fed thirteen months, one with and one without salt. The average weight per head of the *salted* lot, at the commencement of the experiment, was 995 lbs.; at the end of thirteen months, 2,090 lbs. Increase, 1,135 lbs. They consumed per head 15,972 lbs. of hay. One tun of hay, therefore, produced 143 lbs. of increase of animal.

"The second lot, which received no salt, averaged at the commencement of the experiment 896 lbs.; at the end of thirteen months, 1,890 lbs. Increase, 994 lbs. They consumed per head 14,553 lbs. of hay, or one tun of hay produced 137 lbs. of increase of animal.

"The steers receiving salt produced six pounds more increase for each tun of hay consumed than those which were not allowed salt. This may be considered only a slight advantage, and in France did not pay the cost of the salt; in this country, however, where salt is much cheaper, its use will doubtless be profitable. Boussingault remarks: 'The salt exercises no considerable influence on the growth, yet it appears to exert a beneficial effect on the appearance and condition of the animal.' Up to the first fourteen days no perceptible difference was observed between the two lots; but in the course of the month following, the difference was visible, even to the unpracticed eye."

With such good authority, it is presumed feeders will continue the use of salt; but let us give them this one word of caution—do not give it in excess. If you can not get rock-salt, or if that is too expensive, mix fine salt with soft clay, and dry that in large cakes, and lay them under cover for the cattle to lick.

97. **Rock-Salt.**—We reiterate that rock-salt is not only the most economical, but the most convenient for the farmer to salt his cattle, since it can be placed where they can lick it at their leisure, and there it will remain, summer and winter; the rains have very little effect upon it while in a lump, as it comes from the quarry, it being really what its name indicates, a piece of rock. When broken fine it dissolves easily, but not before.

A farmer who has the least idea of economy should learn how much he can save in a year, or a lifetime, by the simple operation of substituting rock-salt in place of that in ordinary use for farm-stock. A lump of rock-salt may be placed in any out-door situation, where cattle can go and lick it whenever their appetite inclines them to do so, and it will not waste by exposure to dew or rain, because it is not hygrometric, as is the manufactured salt in common use. Another thing in its favor is this—your stock, with salt always before them, will never eat too much. Neither will they eat it too fast, as they almost always do when salted with fine salt; nor waste it by scattering it in the dirt, or leaving it to dissolve and sink into the earth. Another difficulty is obviated by the use of rock-salt constantly within reach of stock, and that is, the hooking and punching of the weaker animals by the strong ones, in fighting their way to the once-a-week, or perhaps once-a-month, salting-place.

Rock-salt is a mineral as much as marble, and almost as solid and hard, and is quarried out of mines, like coal or other mineral substances. The most extensive salt mines are at Cracow, in Poland, where there are regular cartways, streets, and villages of miners' huts, where men, women, and children, and domestic animals live deep down in the earth. Our principal supply of rock-salt comes from Cheshire, England, where there are extensive mines. In its mineral state, the salt is of a slightly reddish color, and dingy white, and some of it needs to be melted and purified for culinary purposes. The purest portion may be reduced at once to powder by breaking and grinding, and is then quite white. The salt known here as Liverpool salt is refined rock-salt from the Cheshire mines.

A lump of rock-salt as big as a man's head may be fixed by pins upon a rock or block, where the water will not stand around it, and it will remain until all licked away by the cattle's tongues. In case of stock in stables, a lump may be placed in each manger.

98. **Bones for Animals.**—A good deal has been lately said about feeding animals with bone-meal. We give several opinions upon the subject:

E. C. Wright, of Gallatin County, Ill., states, on the authority of the Rev. John Crawford, of Crawford, in that county, that the bones of swine dying with what is called hog cholera, decay as rapidly as the flesh, and that portions of the skin outlast the bones. He wants scientific men to give attention to this strange consumption of the solids, and thinks that it may be the means of suggesting a remedy for the disease so fatal and so pecuniarily distressing to a vast number of farmers in the West. Now, as we know that feeding bone-meal to animals and phosphate of lime to plants that need it, has proved beneficial, is it impossible or improbable that feeding it to swine suffering from a disease that produces the effect described, may not be the means of curing or preventing the disease?

Dr. Waterbury says: "There are some new theories in relation to feeding phosphates to animals. It is possible that this may have some effect. There is an idea prevailing that feeding material that makes bones will increase their size. It is a subject well worthy of more attention."

Prof. Mapes states that, when a calf is deficient in bone, that is, too weak to stand, feeding bone-meal to the cow that suckles the calf will furnish it with the necessary material. This fact is well known to many farmers, and that cows eat old bones with great avidity. We also know that physicians are using a solution of phosphate of lime in their practice, and there is no doubt it may be administered to domestic animals with equally good effect; and whether, in the case named, it worked a cure or not, it is well worth trying. Many things much more simple have produced wonderful results.

99. **Water for Stock.**—See that your stock have an abundance of clear, good water in hot weather. If it is pumped from wells, it should always be standing in boxes or troughs, so that stock can have access to it. Select, for hot days, fields with plenty of shade trees in them, to protect stock from the burning sun. Pastures should always contain shade trees, and they should be planted, if not there.

Mr. Strawn, the great Illinois farmer, has successfully tried this method of keeping water on a stock farm:

Dig a basin five or ten rods square, and ten feet deep, upon a high knoll; feed corn in the basin to your hogs and cattle, until it is well puddled by the tramping of their feet, which will make it almost water-tight. Mr. Strawn says the rains of a single winter sufficed to accommodate several hundred head of stock, and that it had been dry but once in twelve years.

For watering at the barn, in all situations where digging wells is expensive, cisterns should be provided, if running water from some brook or spring can not be brought in pipes, or sent up by a water-ram.

100. **Chaffing Food for Stock.**—There is no disputing the fact that chaffing food, particularly all coarse forage, will pay well, where it is as dear as it is in the vicinity of New York. At the State Fair Farmers' Club, at Elmira, October, 1860, the following opinions were given upon the subject:

A. B. Dickenson said: "On good hay you can fat cattle, but you can not upon corn-stalks, but they are better than poor hay. I can not make an acre of corn-stalks as good as an acre of grass. If you want to raise a big crop of corn, put on barn-yard manure year after year on grass, and afterward plow it in and make it mellow and rich, sixteen inches deep, and then corn will never exhaust the soil. Corn-stalks must always be chaffed to obtain their full value."

Col. Butterfield, of Utica, said: "Up to two or three years ago, I thought but little of corn-fodder. I then cut the top stalks; now I cut up by the ground, and my cattle do first-rate on corn-stalks till March. To get the greatest benefit from corn-stalks, they must be chaffed and steamed."

Hon. T. C. Peters, of Darien, N. Y., said: "I grow corn for fodder as well as grain, and cut up from the ground, and chaff the stalks for feeding. There is no other feed for milch cows in winter equally valuable if it is well cured and then chaffed; and if steamed, it is still better."

Mr. Lyman Barnard, of Steuben County, said: "I cut up my corn from the ground, and cut the stalks up fine in a stalk-cutter, and mix with cut straw, and I find my cattle and horses do as well, or better, than upon good timothy hay."

Mr. Plumb, of Onondaga County, said: "We don't raise any crop as valuable as corn, and we do raise good wheat. I foddered 150 sheep and 12 cows till March upon ten acres of corn-stalks, allowing the stock to run at a straw-stack besides. I raise the large eight-rowed yellow corn with a small cob, and like it better than Dutton corn. It yields better than any white corn."

It is the opinion of some really scientific men we have conversed with upon the subject, that in all places where hay usually sells as high as $20 a tun, and power is not unusually expensive, that it would pay, not only to chaff all hay, stalks, straw, etc., but actually to grind these substances into meal—not very fine, to be sure, but so that none of the particles would be more than an eighth of an inch in length. We saw, a few years ago, the model of a newly-invented mill that was most admirably well calculated for doing such work as reducing hay and straw to meal. It was the invention of Mr. Blanchard, of Boston.

Flint, in his "Dairy Farming," in speaking of feeding milch cows, says: "One of the best courses is, to feed in the morning, either at the time of milking—which I prefer—or immediately after, with cut feed, consisting of hay, oats, millet, or corn-stalks, mixed with shorts, and Indian, linseed, or cotton-seed meal, thoroughly moistened with water. If in winter, hot or warm water is far better than cold. If given at milking-time, the cows will generally give down the milk more readily. The stalls and mangers ought always to be well cleaned out first."

101. **Nutritive Value of Various Kinds of Fodder.**—The following tables will be useful, as showing the relative value of various substances:

	Net. equivalent.	Per centage of Nitrogen. Dried.	Undried.
1. Meadow hay	100	1.34	1.15
2. Red clover hay	75	1.70	1.54
3. Rye-straw	479	0.30	0.24
4. Oat-straw	383	0.36	0.30
5. Wheat-straw	426	0.36	0.27
6. Barley-straw	460	0.30	0.25
7. Pea-straw	64	1.45	1.79

The following is the composition of these several substances, in which their relative value will more distinctly appear:

Water.	Woody fiber.	Starch, Gum, Sugar.	Gluten, Albumen, etc.	Fatty matter.	Saline matter.
14	30	40	7.1	2 to 5	5 to 10
14	25	40	9.3	3 to 5	9
12 to 15	45	38	1.3	—	4
12	45	35	1.3	0.8	6
12 to 15	50	30	1.3	2 to 3	5
12 to 15	50	30	1.3	—	5
10 to 15	25	45	12.3	1.5	4 to 6

From these tables it will be seen that, taking good English or meadow hay as the standard of comparison, and calling that one, 4.79 times the weight of rye-straw, or 3.83 times the weight of oat-straw, contains the same amount of nutritive matter; that is, it would take 4.79 times as much rye-straw to produce the same result as good meadow hay.

NUTRITIVE EQUIVALENTS. (PRACTICAL AND THEORETICAL.)

ARTICLES OF FOOD.	THEORETICAL VALUES. Boussingault. Water in 100 parts.	Nitrogen in 100 parts of dried substance.	Nitrogen in 100 parts of und'd substance.	Nutritive equivalent.	Fresenius. Relative proportion of nitrogenized to non-nitrogenized subst's.	Nutritive equivalent.	Practical values, as obtained by experiments in feeding, according to Block.	Petri.	Meyer.	Thaer.	Pabst.	Schwertz.	Schweitzer.
English hay	11.0	1.34	1.15	100	—	100	100	100	100	100	100	100	100
Lucern	16.6	1.66	1.38	83	—	—	—	90	—	90	100	100	—
Red clover hay	10.1	1.70	1.54	75	1 to 6.08	77.9	100	90	—	90	100	100	—
Red clover (green)	76.0	—	.64	311	—	—	430	—	—	450	425	—	—
Rye-straw	18.7	.30	.24	479	1 to 24.40	527 7-12	200	500	150	666	350	—	267
Oat-straw	21.0	.36	.30	383	1 to 12.50	445 5-12	200	200	150	190	200	400	2 0
Carrot-leaves (tops)	70.9	2.94	.85	135	—	—	—	—	—	—	—	—	—
Swedish turnips	91.0	1.83	.17	676	—	—	—	300	—	300	250	200	—
Mangel-wurzel	—	—	—	—	1 to 7.26	391½	366	400	250	460	250	333	366⅔
White silician beet	85.6	1.43	.18	669	—	—	—	—	—	—	—	—	—
Carrots	87.6	2.40	.30	382	1 to 7.84	542.1	366	250	225	300	250	270	3 0
Potatoes	75.9	1.50	.36	819	1 to 9.00	330 5-12	216	200	150	200	200	200	200
Potatoes kept in pits	76.8	1.18	.30	383	—	—	400	—	—	—	—	—	—
Beans	7.9	5.50	5.11	23	1 to 2.8	34 5-12	30	54	50	73	40	—	30
Peas	8.6	4.20	3.84	27	1 to 2.14	34½	30	54	48	66	40	Boussingault.	30
Indian corn	18.0	2.00	1.64	70	1 to 6.55	—	—	52	—	—	—	59	—
Buckwheat	12.5	2.40	2.10	55	1 to 6.05	93 5-12	—	64	—	—	—	—	—
Barley	13.2	2.02	1.76	65	1 to 4.25	—	33	61	53	76	50	—	35
Oats	12.4	2.22	1.92	60	1 to 4.08	58 11-12	39½	71	—	86	60	—	37½
Rye	11.5	2.27	2.00	58	1 to 4.42	58 1-16	33	55	51	71	50	—	33½
Wheat	10.5	2.33	2.09	55	1 to 2.42	38 5-6	27	52	46	64	40	—	30
Oil-cake (linseed)	13.4	6.00	5.20	22	—	—	42	108	—	—	—	—	43

Oats in the bundle, well cut up, straw and all, make excellent, cheap feed for horses or other stock; in many cases it is much better than threshing them. For heavy teams hard at work, a little sound corn-meal mixed wet with them, makes a feed that can not well be beaten. It is a highly economical and satisfactory way of feeding, both to man and beast, where oats sell at a low price by the bushel.

102. **A Treatise on Feeding.**—A valuable treatise on feeding, which might be studied with profit by all farmers, has been made by Mr. Horsefall, an English farmer, and published in the journal of the Royal Agricultural Society, which may be found complete as an appendix to Flint's "Dairy Farming."

103. **Soiling Cattle.**—Soiling is a term applied to the practice of confining animals to the stable, and growing a green crop, such as sowed corn, sorgo, wheat, rye, or oats, clover, etc., which is cut up as needed, and carried to the animals, instead of allowing them to have the range of the pastures. Mr. Philo Gregory, of Chester, Orange Co., N. Y., sowed a patch of half an acre, with corn for fodder, making the rows thirty inches apart. With the product he kept *twenty-five cows for six weeks* without other food.

The most extensive and successful system of soiling is pursued by Hon. Josiah Quincy, Jr., of Boston, who has published a small volume giving details of his practice. One of the great advantages of soiling is the saving of manure, the quantity being largely increased over that made by an equal number of cattle at pasture, or fed in the ordinary way. We recommend any one disposed to attempt the soiling system to read Mr. Quincy's book.

104. **Diseases of Cattle.**—We shall not attempt to give a treatise upon the

diseases of cattle and the remedies; for this, we must refer the reader to Dr. Dadd, veterinary surgeon, Boston, and his valuable writings, as well as several other good publications, not forgetting the *Stock Journal*, New York. We will give, however, the following sensible remarks upon one of the most common diseases, or symptoms of disease, from Thos. E. Hatch, Keene, N. H.

105. **The Horn Ail.**—Mr. Hatch says: "'Horn Ail,' or 'Hollow Horn,' is an absurd misnomer for an imaginary disease in many cases, and for a symptom of fever in others. Many a farmer has reluctantly 'cut off one inch,' or more, from the tail of a beautiful animal, when it was turned out to pasture, under the erroneous impression that it would do better, 'for the hair hung in curls,' although the animal was in perfect health and good condition, and needed no remedy of any kind. In fever, the degree of arterial excitement is estimated in part by the heat at the base of the horn, which is very thin, and covers the most vascular bone in the animal, thereby displaying symptoms of great value to those capable of appreciating them.

"But even in fever there can never be the slightest occasion for 'cutting off one inch of the tail,' nor for *pouring boiling water* upon the horns of a suffering animal until he '*dodges*.' A cathartic of epsom or glauber salts, sulphur or linseed-oil, combined with ginger, red pepper, or any stimulant aromatic, will do all the good, and much more, than the slight bleeding from the cut can do, and not leave the animal to thump its sides the remainder of its life with a mutilated stump, a living monument that all the darkness of the dark ages has not yet passed away.

"The hope that I may be the means, in a single case, of preserving intact one of the beauties of the bovine race, to the unfortunate animal suffering from 'Horn Ail' or 'Tail Sickness,' is the only apology that I can offer for this communication. I would as soon knock off the horn, or slit the ears of a favorite animal, as to 'cut off one inch of the tail,' and should have as good physiological reasons for so doing. The disfigurement in either case would be about equal, but the inconvenience which the animal would suffer from the loss of the long, silky brush so kindly furnished by nature, especially in 'fly time,' would be immeasurably greater."

The Ohio *Kercuma*, an ounce to a dose, given in whisky a few times to a cow with this disease, is recommended as a valuable cure. In our opinion, good feed and warm stables as a preventive are worth more than all the cures.

106. **Cure of Scours in Cattle.**—An English farmer recommends the use of acorn-meal as a sure cure of diarrhea in horned cattle, sheep, and lambs, and young stock generally. He says:

"I sent the dried acorns to the mill to be ground into flour, and when I found symptoms of scour or diarrhea in my cattle, I ordered two handfuls to be mixed in a bran mash, and given warm immediately, and to continue it once a day, until the disease disappeared. This proved a never-failing cure—insomuch that I never had any trouble from the disease afterward; and my neighbors, seeing this, had recourse to me for a little of my acorn flour, when the disease appeared in their cattle, which, of course, I was glad to give them, the result being the same as in my own case."

107. **To Cure Lice on Cattle.**—Some farmers have great faith in the efficacy of onions for ridding cows or oxen of lice. Mr. Roe, of Orange County, N. Y., claims to have found them an infallible remedy in his practice. They also give a tone to the stomach, and are especially valuable in hot weather, when working cattle will lie in the shade at noon-time, and refuse to eat. Mr. Roe uses the "scullions," or small, unsalable onions, and those which become soft or sprouted toward spring. He gives a feed of half a peck once a day, at noon, and says that two feeds are sufficient to extirpate any number of vermin.

A correspondent recommends the following remedy for lice or ticks: "One tablespoonful of sulphur to one pint of salt, mix thoroughly together, and feed to cattle or sheep once a week, in quantities, as we usually feed cattle, for two months in succession, and there will be no ticks or lice on them."

108. **Cattle Poisoned with Brine.**—Many farmers have learned to their sorrow that old brine, placed within the reach of hogs, cattle, and perhaps other farm stock, will cause death; and as there are others who may not have learned this fact, we now place it on record for their benefit. We will also give the results of certain investigations made at the Veterinary School, at Ayort, France, by M. Reynal, which throw additional light upon the subject. It is ascertained that the poisonous properties of brine are not immediately acquired; but it assumes this condition only after it has been in contact for several months with the meat, when, if mixed with the food of stock, even in small quantities, it will produce death; but when hogs and other stock can get to it, unmixed with food, its effects are still more speedily fatal. The poison acts as a local irritant, exciting violent intestinal congestion and inflammation. It likewise increases the secretion of the skin and kidneys, and exerts a direct effect upon the nervous system, giving rise to trembling, loss of sensation, convulsions, etc.

The salt of the worst brine may be saved in a pure state by boiling the brine and carefully skimming off all the scum. The remainder may then be used as brine, or reduced to salt by still more boiling.

109. **Cattle Poisoned by Wild Cherry Leaves.**—It is not an unusual thing for cattle to be poisoned with the leaves of the common wild cherry-tree, which are almost sure death if eaten in a wilted state, unless a remedy is immediately administered. The most convenient, ready remedy which a farmer can use is hog's lard and molasses, mixed in about equal quantities, by melting the lard and warming the molasses. It should be given in doses of a pint or a quart, by means of a black bottle, pouring it well down the animal's throat.

110. **Overstocking the Farm.**—This is about the worst practice in farming, as regards stock, either in summer or winter. It is not only unprofitable to keep useless animals, such as horses or oxen, but if you are overstocked, the whole must deteriorate. There is nothing about a farm that has a more

distressed appearance than half-starved animals, and there is nothing about farming that is more unprofitable. Even the manure accumulated from such stock is far less valuable than that saved from well-fed animals.

The most important thing in farm-stock is a good team, and that should be the first consideration. Have a team or teams sufficient to do all your work, except some particular things, such as threshing, and for such extra work have a standing arrangement, if possible, with a neighbor to exchange team work. You can not afford to keep any extra team. You may be overstocked in any other kind of animals with less damage than working ones, but you can in no way afford to do without enough of them, and the better they are, the better it will be for you. Farm-stock must be adapted to circumstances to be profitable. When milk sells at two cents a quart, at or near the farm, milch cows are profitable stock, because if one average five quarts a day, her milk will bring $36 50 a year, and some of the milch dairy cows near New York double that. The average we have heard estimated at $45 for all the cows kept on a farm. We have known the profit of grazing a herd of fatting bullocks through the season often to range from $38 to $40 a head, but we could not recommend every one to go into the business, because it requires skill in buying, keeping, and selling that all do not and are not likely to possess. In all cases farm-stock should be adapted to circumstances, and there is certainly a want of judgment in this respect that is amazing. Men in Mississippi have tried to raise fine-wool sheep suited to Vermont, and men in Vermont have tried to use mules for farm-work, instead of their own hardy breed of horses, because they had read that they were much the most economical for farm-work in all the Southern States. The pastures of New England are noted for their sweet grass and excellent red cattle; and the blue-grass fields and fat Durhams of Kentucky are equally noted, and all should know that it would not serve either section to advantage to exchange breeds of cattle. The adaptability of stock to the farm is a subject that we do not wish to dictate upon, but we ask reasonable men to take counsel with reason, and apply that in all cases to their own circumstances.

111. **Imported vs. Native Stock.**—Robert Purvis, of Byberry, Penn., has a farm in a high state of cultivation, one of the best in Pennsylvania, and consequently, in our opinion, his ideas are entitled to a share of our respect. He says:

"For many years I have made it my business, as it has been my pleasure, to do what I could to promote the improvements of farm-stock. My chief attention has been given to cows, hogs, and fowls, though I have not been unmindful to other varieties. Of cows, I have raised the Durham, Ayrshire, and the Devonshire; of hogs, the Berkshire and the Suffolk; and of fowls, a great variety. I have confined my attention chiefly to those of foreign growth or origin. That I have succeeded as well as others, may be inferred from the fact that at the various shows I have taken a fair share of the premiums. Nevertheless, my success, though encouraging, has not been altogether satisfactory; that is, it has not proved to me that any of these foreign breeds, whether of cows, hogs, or fowls, are the best that we can have in this country, or are just the thing we want. On the contrary, it has demonstrated to me quite the opposite, viz.: That before we can attain the desired success in this field of experiment, we must give more attention than we are now giving *to animals which are the growth of our own soil.* Not that I would undervalue the advantages of importing the best varieties of foreign breeds, for too much praise can not be rendered those public-spirited men who spend their money liberally in bringing to our shores the best specimens they can obtain of European animals; but, at the same time, too little credit may be given to others who are doing what they can to improve our native breeds.

"I don't know how it may be with others, but according to my experience and observation, there is an *unvarying tendency in all imported stock to deterioration.* Whether it is owing to the climate, or soil, or what, I don't pretend to say; but this tendency to degenerate in all foreign animals, whatever pains may have been taken with them, has been, according to my knowledge, without an exception. Now, assuming this to be true, which, understand me, I do not aver, the question arises: Would it not be better for us, in trying to improve our stock, to make our selections for the purpose without regard to the animal's origin? In milch cows, for instance, ought we not to choose the finest-looking animal and best milker we can find, whether native, imported, or mixed? and ought we not to see that the offspring are the product of a sire chosen on the same principle? Is it not likely, and does not experience, so far as it has been made, show that the tendency of this sort of breeding is to a continual improvement in the stock? I would ask the same questions in regard to hogs, fowls, horses, sheep, and all other kinds of animals. In other words, ought we not to make more account of our native breeds, and seek, by judicious crossing and care in other respects, to attain the end which we have not yet reached in the matter of stock-raising?"

Do farmers generally sufficiently appreciate the reason why imported or high-bred cattle look so much better than the natives? Is it not because one class is high-fed as well as high-bred, and treated with the greatest possible care, while many of the poor natives are treated with the greatest possible neglect—exposed to storms, summer and winter, and kept upon short pasture while it is possible for the animals to get a living, and then grudgingly fed coarse herbage to carry them alive through the winter. With such treatment, the poor natives have no fair chance to compete with the pampered stock lately imported; yet, with equally good treatment and constant care in breeding, we believe as good cattle may be raised up out of some of the natives as can be found among those imported and maintained at such great extra expense. At least, we believe that if as much care had been bestowed on our native stock as has been on the imported breeds for the last thirty years, the natives would now be nearly equal to the imported.

PLATE VI.

(Page 81.)

The subject of feeding swine is treated of in Section II., but to enable readers to understand the style of the different breeds, fed to a condition for show, we have preferred to direct his attention to this picture rather than to a written description. Upon the left hand he will see representatives of the Berkshire, black and white. In the center are the beautiful white, thin-haired Suffolk, and on the right the black, thin-haired Essex, a favorite breed in England, lately introduced into this country. Indeed, all three of these named are favorite English breeds. On the right, in the rear, an American breed, the Chester County, is represented. All that is known of the history of this breed is briefly told in ¶ 13. This picture of four families of swine is equal to any other ever printed. It is worthy of careful attention.

Above the swine, as they always should be, in the estimation of farmers, are the sheep, showing good representatives of the three great families of long wool, fine wool, and medium. On the right, the long-wool variety, under the name of Cotswold, are well represented. In the center, the pair of merinos stand as fair types of the fine wool, and are handsome portraits of the large-sized sheep of this variety. The noble South Downs on the left show what this breed looks like. Their black faces and legs and round, full bodies are characteristics of the family. Altogether, these four families of swine and three of sheep make a picture that is not to be passed lightly over.

DIFFERENT BREEDS OF SHEEP AND HOGS IN THE UNITED STATES.

Why should we import hogs? All the improved English breeds are *made up*. And why we can not just as well make a breed here that shall suit our circumstances, and need no acclimating, we can not imagine. The fecundity of pigs gives the breeder a greater facility in improving his hogs than he possesses with any other large domestic animal. Let him have an object in view and steadily pursue it for a few years, and success and great profit are certain.

SECTION VII.—SHEEP HUSBANDRY.

Breeds of English Sheep.—At a recent meeting of the Central Farmers' Club at London, Mr. Charles Howard delivered an address on the subject of "The Merits of Pure-Bred and Cross-Bred Sheep." In this address he gave the origin and merits of several of the "established" breeds. We condense as follows:

I. SOUTHDOWNS.—"The South, or Sussex Downs, are descended from small, gray, and dark-faced sheep which were found on the hilly and mountainous districts throughout England. John Ellman was the original improver. He was followed and surpassed by Jonas Webb, who has made the Southdown perfect. The peculiarity of this sheep is its superior quality of mutton and wool. Average weight, from thirteen to fifteen months, is 126 lbs.; weight of fleece, 6 lbs. The ewes are capital breeders, and generally produce one third twins. They are best adapted to elevated situations and bare pasturage. Among the nobility and fancy farmers they are regarded as the *élite* of sheep.

II. HAMPSHIRE DOWNS.—"This valuable sheep has been established from various crosses, commencing with the century. They present as great a uniformity in wool, color, and general appearance as their smaller but handsomer cousins, the Southdowns. They have risen into favor rapidly. They are very hardy, and of good constitutions, and good wool-bearers, the average fleece being 6 to 7 lbs., of early maturity, and have plenty of lean as well as fat meat, and will graze to almost any weight you may choose to make them. The ewes are good breeders and sucklers.

III. LEICESTERS.—"These originated with Bakewell. To this breed all other long-wooled sheep are indebted for their improved shape and greater disposition to fatten. Their chief characteristics are, great aptitude to fatten with a comparatively small consumption of food, and early maturity; fleece, 7 lbs.; carcass, at fourteen or fifteen months, 140 lbs. They are not very good breeders, and it is a rare thing to have more lambs than ewes.

IV. THE COTSWOLD.—"This is one of the oldest of the established breeds.

They were originally heavy, coarse animals, with a thick, heavy fleece, well adapted to the bleak, uninclosed Cotswold hills. They are now *very* hardy, and will succeed well in almost any situation, and produce a great amount of wool and mutton at an early age. They sometimes reach 86 lbs. to the quarter. The average weight of an ordinary flock when fit for the butcher, at fourteen or fifteen months old, is about 180 lbs., and the weight of wool of the whole flock would be about 7½ lbs. each. Many of these sheep are now being exported to Australia to produce mutton for the miners.

V. Lincolnshires.—"As the western part of Great Britain is famous for its Cotswolds, so is the northeastern esteemed for the heavy-wooled and large-framed Lincolns, to which district they especially belong, and where for many years they held their own. They, like the Cotswolds, have been improved by an admixture of Leicester blood. The present improved Lincoln sheep partakes largely of the peculiarities of the Cotswold and Leicester, having the expansive frame and nobility of appearance of the one, with the quality of flesh, compactness of form, beauty of countenance, and propensity to fatten of the other; but they far exceed either in weight of fleece. Three-year olds sometimes weigh 96½ lbs. to the quarter, and yearlings 71 lbs. The weight of wool of an entire flock, under fair average management, is about 8½ lbs. each; weight of carcass at twenty-eight months, 160 lbs. The Lincoln breeders consider the mutton excellent, having less fat and a greater proportion of fine-grained, lean flesh than the Leicesters. The ewes are good breeders, but, like the Cotswolds and Leicesters, they are not good sucklers.

VI. Shropshires.—"These are crosses. Their merit consists in their superiority over any other breed in their own country. They possess hardiness of constitution, excellent quality of mutton, and are prolific breeders; but they are not equal to other breeds.

VII. Oxfordshire Downs.—"This breed of sheep was produced twenty-seven years ago by crossing the Hampshire, and in some instances Southdown ewes, with Cotswold rams, and then putting the crosses together. They drop their lambs in February, and at thirteen or fourteen months old they are ready for market, weighing, on an average, 140 lbs. each, with a fleece varying from 7 to 10 lbs. The ewes are good mothers, and produce a great proportion of twins."

We might add here, as these last two breeds are crosses, that Mr. Howard stated, at the conclusion of his experience and address, "that from a judicious pairing of cross-bred animals, it is practicable to establish a new breed altogether," and for some locations better fitted than most of the existing breeds.

113. **Production of Sexes among Sheep.**—The *Journal d'Agriculture Pratique* has a paper giving a variety of facts on this subject—from which the deduction is made, that the sex depends on the greater or less vigor of the individuals coupled. This has long been known and acted upon. It is further stated, as shown by careful observation and experiment, that more males are born among the first and last births in a flock reared by a single

ram, than among the lambs born in the intervening period, when the male is weakened by excessive exertion; and that the ewes which produce males are on an average lighter than those which produce females, and lose more weight than the latter during the nursing period. Thus vigor in the male tends to produce males, but more from the weaker than the stronger ewes; and the opposite fact in regard to females tends to keep up the equilibrium, and secure the perfection and preservation of the species, by confining the reproduction of either sex to the most perfect type of each respectively.

114. **First Importation of Merinos.**—The first importation of Spanish sheep into the United States took place in 1801. Four were shipped by Mr. Delessert, a banker of Paris, three of which perished on the passage. In 1802 a large importation was made by Col. Humphreys; and in 1809, '10, and '11, the Hon. Wm. Jarvis, the American consul at Lisbon, sent home large and valuable flocks to his farm in Weathersfield, Vt.

115. **General Care and Management of Sheep.**—There are not many men in this country more capable of giving information upon this subject than T. S. Gold, of Cornwall, Connecticut. In the series of Yale College lectures, in the winter of 1859, '60, Mr. Gold gave a lecture upon sheep husbandry, in which he made the following points, worthy of note by all sheep farmers:

"*Thrift.*—It should always be the object of the flock-master to keep his sheep in a thriving condition. The quality of the wool, as well as its quantity, and the general productiveness of the flock, demand this system.

"*Shelter* is the first necessity in providing for wintering sheep successfully. The Southdowns will bear exposure better than any other class of sheep. The open fleece of the long-wooled parts on the back when wet, and admits the water, which completely drenches the animal, so that his abundant fleece is no longer a protection from cold.

"*Economy* in *feeding* demands shelter for all sheep, as not only less food is required, but also it is better preserved from waste. Water-soaked hay, or that which is in any way soiled, is always rejected. The improvement in the quality of the *manure* forms another argument in favor of shelter. That this is not only healthful but grateful to the sheep at all seasons of the year, we see in the fact that even in summer they will seek their winter sheds at the approach of a storm if they are within their reach.

"*Ventilation* is of paramount importance as connected with shelter; and to insure this, sheds open to the south are to be preferred. A stable with an open window will answer for a small number, but the crowding of a large flock in such a place affects the organs of respiration, and may result in serious disease, and should never be tolerated.

"The best form of *rack* has posts three feet high in the corners, a bottom of boards, the sides and ends of two boards each, and the lower one the widest, with narrow perpendicular strips nailed on to keep the stronger sheep from crowding the weaker. The spaces are larger in their perpendicular than their horizontal opening. The size of these, as well as the width of the rack, must be in proportion to the size of the sheep. Not more than one hundred of the fine-wooled sheep should be confined in the same yard, while the long-wooled will not thrive with more than twenty-five. A *hospital*, snug and comfortable, should receive any sheep that may be weak from age or disease, until, by careful feeding and nursing, they can be returned to the flock.

"It is the worst possible practice to allow the sheep to fall away in flesh, as the grass fails in autumn. The increasing wool conceals the shrinking carcass, much to the disappointment of the careless flock-masters. Better confine them in the yard than allow them to ramble about in search of some field of winter grain, which furnishes a little green food, but too light to be of any real value.

"*Winter fodder* should embrace, in addition to the dry food, a due proportion of that which is green and succulent. Fine early-cut clover hay, well cured—that from old meadows, consisting of a variety of grasses—forms the best dry fodder. *Economy* demands that the quality should be good, else much waste ensues; yet the sheep is very fond of variety, and almost all of the so-called weeds become a choice morsel. The botanist knows full well that a sheep-range will be most barren of the objects of his search. The immortal Linnæus tested the plants most indigenous to Sweden by offering them, fresh gathered, to the various domesticated animals. Horses ate 262 species, and refused 212; cattle ate 276 species, and refused 218; while sheep took readily 385, and refused only 141 species. For fattening, add to the hay, roots, grain, or linseed, or cotton-seed meal. The English system of winter feeding on turnips in the field is here prevented by excessive cold. Use them in the yards in moderate weather. Sudden changes from green to dry food, and the reverse, should be avoided. Regularity in the hours of feeding is very important.

"The amount of fodder varies with the kind of sheep, though it is not directly proportioned to the live weight. Ten small, fine wooled sheep will eat as much as a cow, the larger ones requiring more. Two to two and a half, or even three and one third per cent. of the live weight in hay value is estimated by different authors as daily required.

"No other animals except calves should lie in the yards with sheep. The losses from the horns of steers and the heels of colts more than balance any supposed gain. As the breathing of the sheep on the hay does not of itself render it distasteful to cattle, it may be gathered from the racks and fed in another inclosure.

"It is estimated that 300 lbs. of good hay will winter a small sheep, while larger ones may take three times the amount.

"*Water* is absolutely necessary to the thrift of the sheep in the winter. It is best brought into the yards, as the steep banks of streams prove dangerous to the sheep.

"*Salt* may be provided in winter by a moderate salting of the hay—two to four quarts a tun; but excessive salting must be avoided, for with it neither sheep nor cattle will thrive.

"As the lambing season approaches, snug quarters must be provided for the breeding ewes, where they can be clean, warm, and dry."

116. **Grain for Sheep.**—Major Wm. Lee, one of the most successful wool-growers of western Pennsylvania, manages his sheep as follows, according to the *Ohio Farmer:* "They are not confined to sheds; they are only provided with a dry place for shelter and rest. After they rise of their own accord, in the morning, he feeds again, two thirds corn, and one third barley or oats. Afterwards he feeds hay, and also at three o'clock again, so that the sheep have finished eating before nightfall. He considers that corn will make more wool than oats, and general opinion favors out-door feeding. Sheep housed will not eat as much, nor will they shear as much wool."

Another sheep-farmer says: "I am willing to make affidavit that with me, in many years' experience carefully tested, sheep *of the same kind*, weighing from 110 to 130 lbs., will put on more fat and gain a great deal more weight on 1 or 1¼ lbs. of grain or oil-cake per day, in three or four months, *with only straw for fodder*, than those weighing 80 to 90 lbs.; and I value a sheep weighing 125 to 130 lbs. as worth half a cent more per pound of live weight, for me to feed fat than one weighing 90 or 100 lbs. Now, no man will suppose that the straw will put on any fat, or make sheep *gain* in weight. If you feed sheep straw only, they would lose weight, and that greatly; but with a pound of meal or grain daily, they will gain daily. I can prove all I have said by neighbors who have been feeding for a few years past, and who will now only buy the largest sheep of their class, or the largest cattle of their age."

117. **Weight of Hay for Sheep.**—The question, How much hay do sheep or cattle require per day? is thus answered by Alexander Speck von Sternberg, of Lutzchena, Saxony, to the Hon. Joseph A. Wright, American minister at Berlin. He says: "*One thirtieth part of the weight* of the live animal, in good hay, is considered necessary per day for its sustenance. According to the quality of the fodder, and its abundance or scarcity, this may be increased to one twentieth part; but less than one thirtieth part ought not to be given. Taking good meadow hay as the fodder standard, a ram should receive about 3¼ lbs. per day, a ewe about 2¾ lbs., yearlings, etc., in that proportion—taking the average of a full-grown ram at 110 lbs., of a ewe at 72 lbs., the weight of each varying, according to age, size, and condition, between 105 and 125 lbs. as regards the full-sized rams, and from 70 to 85 lbs. as regards the full-grown ewes. The weight of a wether varies between 80 lbs. in lean condition, and 110 to 115 lbs., if strong and fat for the butcher. One pound of good meadow hay is considered equivalent to 1⅔ lbs. of oat, pea, wheat, or barley straw, 4 lbs. of turnips, or 2 lbs. of grains in the wet state, as delivered from the brewery in winter. When the time for stabling for winter arrives, the sheep-master has his supplies of straw, hay, and turnips allotted to him on the basis of the above calculation, and he is bound to make them serve out the proper time, under-feeding being as much guarded against as over-feeding and waste."

Another writer says: "The usual rate of the consumption of food is at the rate of $3\frac{1}{2}$ lbs. of hay daily for every 100 lbs. of live weight. If we take the average of flocks, the live weight of 100 common sheep would be about 7,500 lbs., or from that up to 8,000 lbs. It is rare that a whole flock of fine-wooled sheep will average more than 70 lbs. for each head, though it may be that this weight is exceeded in some instances. At the rate mentioned, a flock of 100 sheep should use up or consume 280 lbs. of hay per day, or a total of 25 tuns in the winter season that lasted 180 days. This would also equal 504 lbs. to each single sheep; or it may be stated as a general rule, that a full-grown Merino sheep, averaging in live weight from 75 to 100 lbs., will consume during the winter season a quarter of a tun of hay, or its equivalent, if comfortably kept. If grain forms a part of the ration, of course some of the hay may be saved; but if the animal is to be kept growing wool, it will need its full ratio of hay, and a little grain, too."

118. **Changing Pasture.**—Some sheep-farmers are very particular about changing pastures. This is right, if the inclosures are small. If there is a wide range, it is of no particular advantage to confine sheep to one portion of it, and then shift them to another.

119. **Feeding Sheep vs. Beeves.**—Mechi, who is a highly enlightened and practical English agriculturist, says he is convinced that beef must sell at 20 per cent. higher than mutton to make them pay alike. He also remarks, that he agrees with a friend of his, who says, that he who keeps many bullocks will never need to make a will.

Our observation in relation to the comparative profits in this country coincides with Mr. Mechi.

Thos. Bell, of Monmouth County, N. J., makes the following statement in regard to the profits of feeding sheep:

"I usually keep about 100 sheep, and renew my flock every year. My neighbors and myself agree with a drover to take certain numbers, and he goes up the Delaware into the State of New York, where he obtains a large strain of common sheep. I buy the best ones in the flock, paying the highest market price, which this year was \$3 50 a head, while my neighbors prefer to take the lower-priced sheep, graduating down to \$2 50 or \$2 25 a head. I get my new flock in about the 1st of October, and immediately put the ewes to full-blood Southdown bucks, so as to have the lambs dropped early in April. I have good autumn pasture, so as to keep the flock in good condition to go into winter quarters, where I keep them in yards with open sheds, fifty sheep in a pen, with feeding-racks, and freedom to lay under cover or out in the open weather. Their own instinct governs them about seeking shelter when it storms. I feed the flock once a day upon hay, and once a day upon whole stalks of Indian corn cut from the ground as soon as it is hard enough to ripen in the shock, when the shocks are well cured, and afterward the corn is husked and stalks stored for winter. The sheep trim them of leaves, and the dry stalks make good bedding for them. I watch my ewes and take them out of the flock as the time approaches to drop their lambs, and put them in other yards, where they are fed on grain and good hay, and I seldom lose a lamb. I graze my flock upon less than eighteen acres of good pasture, which has been made to produce sweet grass by the application of green sand marl, by which I have renovated a worn-out farm. By the end of July I have my lambs, which are large and fat, and well marked with the Southdown characteristics, all off to the butcher—this year at $4 75 each, selling the whole lot to one man. I could have sold them in small lots so as to average $5 a head. The ewes, after the lambs are taken off, become fat upon grass alone, so as to bring the best market price of that class of sheep in September. I have just sold all off, and find that the 100 head which I purchased at $3 50 one year ago, have yielded me in wool, lambs, and old sheep $7 50 a head over the cost of the stock. Last year I realized $7 a head profit, or rather, I got that for keeping 100 head of sheep one year, and I think that sum may be safely calculated upon every year. And besides this profit, I find my sheep are enriching my land and are more advantageous in every way than any other kind of stock. Every farmer keeping sheep should have a lot of movable fence, and inclose small plots—say half an acre at a time—of the poorest parts of the farm, such as gravelly knolls, upon which to yard the flock nights. The only drawback to keeping sheep upon hundreds of farms near New York is the worthless cur dogs. In New Jersey we have a good law which gives out of the general tax $5 a head for all sheep killed by dogs. That insures every common sheep, but does not warrant me in keeping full-blood Southdown or other valuable breeds. The State of New York needs a stringent law against dogs to protect the interest of farmers who keep sheep, particularly in the counties near the city."

The above statement of Mr. Bell is a very encouraging one, and would doubtless encourage many of the farmers convenient to the city market to adopt the same course if the State Legislature would protect them against dogs. The question resolves itself into this simple form: Is it of more general advantage to the State to grow wool and mutton than it is to grow dogs —dogs, too, of the most worthless sorts? It is one of the rarest things in the world that a shepherd dog or a good house watch-dog ever kills sheep. It is only the meanest, prowling, thieving, worthless curs, of no value to their owners, that destroy sheep. Let us have a law to annihilate them, and then every man can keep sheep with the same results as Mr. Bell.

Mr. Carpenter, of Elmira, said: "A neighbor of mine makes just about the same average upon his flock of grade Southdowns. He shears six pounds of wool per head, and he sells his lambs at $4."

Samuel Thorne, of Dutchess County, N. Y., pursues the same course, with the same results, as Mr. Bell.

Mr. Wade, of Canada West, says: "That he prefers the long-wool sorts, because they are more hardy. The mutton sells readily, and the wool, though not worth so much a pound as the fine-wool sorts, weighs so much more that the value of the fleece is equal. We don't grow much corn, but we feed a great many roots, and feed well. It is foolish to try to keep any animal upon low diet. We feed anything that sheep eat best, and I fatten principally upon turnips and hay, with a little meal. The long-wool sheep are better adapted to Canada than the fine-wool. We shear eight pounds of clean wool per head. The Cotswold variety are preferred; they have stronger constitutions than the Leicester sheep."

Gen. Harmon, of Monroe County, says: "I commenced with fine-wool sheep, forty years ago. I then tried Leicestershire, and then came back to Merino. I have less than 200 acres, and grow 30 or 40 acres of wheat every year; the land improves by sheep. My average weight of fleece is five pounds. I keep 330 head, and get over $700 a year for wool and increase. I stable 50 sheep in a room 14 by 40 feet, without change in the winter. I wash my sheep clean and let them run six or eight days, and then shear. I don't breed from gummy sheep. I feed in board-racks, with straight sticks, so the sheep can put in their heads. There are about 25 acres of reclaimed land on my farm that will keep sheep alive, but won't fat them. My farm is limestone, and I prefer fine-wool sheep to any other for profit; and I consider sheep twice as profitable as cattle upon any grain farm. I never breed from ewes less than three years old. I don't like the cross of Leicester bucks upon fine ewes. I have sold of wool and sheep over $900 a year."

Lewis F. Allen, of Black Rock, says: "I have kept sheep twenty-five years upon a clay loam, natural to sweet grasses, limestone formation, on the Niagara River. There is no general rule as to the profit of keeping sheep. All depends upon circumstances. In Canada I have seen the best long-wool sheep I ever saw, but these sheep are too fat for eating. You might as well dine off a cake of tallow as such meat. Such sheep may be profitable in Canada. With me those sheep require good shelter. They are not kept warm by their long fleeces. My sheep sheared five to eight pounds of wool. I don't approve of feeding many roots except to breeding ewes. They are likely to scour sheep; at least they do mine.

"On some soils it may be best to plow in clover; on other soils it is not. As to mutton sheep, I have fed Southdowns, and the cheapest way that I can make mutton is upon grass, and wethers of 150 lbs. bring five cents a pound gross at Buffalo. I would keep mutton sheep if I had a good farm on a railroad. I can always sell my lambs at $2. My Southdown fleeces bring $1 50 average. Southdown mutton is the best we have, and the sheep always sell well for mutton. The fine-wool sheep mutton is apt to taste of the greasy wool. The Merino sheep are a hardy race of sheep, but they are not a good breed to feed for mutton."

Mr. Bowen, of Orleans County, says: "I have bred both coarse and fine sheep. I have raised coarse-wooled sheep that weighed 150 lbs. each at one year old. I find the coarse-wool breed the most profitable. My sheep average six pounds of wool, that sells at 31 cents a lb. My sheep are a cross of Cotswold, and are close-wooled and hardy. I live on a gravelly loam, wheat soil, and I think it desirable to increase the stock of sheep in this State. A field of clover fed off by sheep will yield more wheat than if not fed off."

Mr. Pettibone, of Vermont, says: "If a man keeps but few sheep he should keep a mutton breed. If he keeps a large flock, or say 200 or 300, he should keep fine-wool sorts. The trouble in sheep-breeding is in letting them run down in October. I winter 300 head, and 100 ewes will give 100 lambs. I use 400 acres, but many of them are on the mountain, and valued at only $7 an acre. I do not let all my ewes breed. I keep my sheep in very close winter quarters on hay. I feed breeding ewes one peck of corn a day to 100 head. In eleven years I have not had a lamb die, and ewes are kept without grain, but always with water and salt by them. There is a material difference in the value of the fleece, according to the way sheep are kept. I prefer always to have my sheep fat. In January I select my ewes, and never sell the choice ones. I have a ewe that has produced eighteen lambs and shears four pounds of good wool. I do not select the most gummy sheep for my use; they are much more tender than those less gummy. Still, you must have greasy wool if you have fine wool. I feed generally twice a day—sometimes only once. The sales of my wool last year produced over $2 a head for my flock, and the average for fifteen years has been four and three quarter pounds, such as sold this year at 50 cents a pound. My land is limestone clay loam. I have picked out and sold twenty wether lambs to a neighbor who sheared eight pounds a head, and sold two sheep for mutton at $3 50 a head. A flock of 300 head of sheep ought to average five pounds of clean wool. I select in the fall eight or ten wethers, and feed them with meal through the winter, and give them good grazing in summer, and kill through the summer, and the tallow averages 10 or 12 lbs. and the meat 10 or 15 lbs. per quarter. The pelts sell at 75 cents. A three-year old wether, pure Merino breed, often weighs 75 lbs. I have sheared 14 lbs. of wool per head from bucks, which sold for 50 cents a lb., and 8 lbs. of wool from ewes."

A. B. Dickinson says: "I have sheared 11,000 sheep in a year, and know something of them. The man who raises sheep for mutton had better raise the largest kind, for they produce the most money, though they may not make the best kind of mutton. For wool, I would keep none but the fine-wooled variety of sheep, but I would not keep the gummy sort, because the clean wool will always produce the most money. In washing sheep, I am sure that the wool can always be made cleaner when the sheep are washed in a vat than in a stream. If 20 sheep will weigh 20 cwt., they will eat just about as much as two bullocks of that weight—that is, if they are mature sheep. Young sheep eat more, according to live weight, than old ones."

Mr. Johnston bought thirty Leicesters one fall, put them in his yards, fed them each twelve ounces of oil-meal with wheat straw, and *no hay*, all winter. In spring he sheared from them five pounds of wool each, pastured them all summer, kept them over until the following February, and sold them for *nine dollars and twenty cents* each. They cost him two dollars. Sheep fed with oil-cake meal or grain eat but little salt, make richer manure, more wool, and more carcass. He gives usually one pound of oil-meal when feeding with straw, and half a pound with hay. If there should be any signs of foot-rot in the flock, he pares the hoof, and rubs into the sores a salve of blue vitriol and lard. In very hot weather he mixes tar with the salve, to make it adhere. Sheep are never let out of the yards in winter, but to the yard they have free access at all times from the low, open sheds, and every part of the sheds and yard are deeply bedded with clean straw. The shepherd, instead of wading through a slough worse than that described by Bunyan, walks on a soft bed of straw, so clean at any time as not to soil the white fleece of the cleanest Leicester.

Wm. H. Ladd, of Ohio, says: "My practice is to turn the lambs in with their mothers, after they have been separated some twelve hours, and as soon as they nurse, separate them again; then, after twenty-four hours, allow them to nurse once more. Since I have adopted this plan, I have never had a ewe's udder injured. Lambs should have a very little salt frequently, when first weaned, as the herbage lacks the large proportion of salt which the mother's milk contains. But great care should be used not to give them much salt at once, or it will set them to purging; and if a lamb commences to purge soon after being taken from the mother, it seldom, if ever, recovers from it.

"Lambs that come early are invariably the largest, strongest, and most healthy; consequently they are the best breeders. The ewe that has her lamb early has sufficient time to get in good order before winter, and after the lamb is weaned, she is not subject to weakness and disease, as those of late weaning, and is consequently a better breeder the next season. Poor, late feeble lambs and ewes should never be permitted to breed, for if such are, it invariably follows that the flock will degenerate. Generating or breeding ewes should be carefully selected. Ewes sometimes continue strong and productive until twelve or fifteen years of age; this depends on their general health and constitution."

120. **Age of Sheep for Mutton.**—A late English writer says: "A sheep, to be in high order for the palate of the epicure, should not be killed earlier than five years old, at which age the mutton will be rich and succulent, of a dark color, and full of the richest gravy—whereas, if only two years old, it is flabby, pale, and flavorless."

121. **Grub in Sheep.**—Take one quart of whisky and two ounces of yellow snuff, mix, and warm to blood-heat. Let one man hold the sheep, and another take a small syringe, and discharge about a teaspoonful of the mixture into each nostril. It is said to be a certain cure.

122. **Gross and Net Weight of Sheep.**—The usual estimate of gross and net weight of sheep is, that the dressed carcass will weigh one half as much as the gross weight, and therefore, when the sheep are sold at, say five cents a pound alive, the price is equivalent to ten cents a pound for the meat, sinking

the pelt and all the offal, so that the butcher, if he could sell the carcass at cost, would still have the pelt, rough fat, head, etc., for a profit. Hence it will be seen how it is that mutton in the carcass is often quoted in market reports at less than it appears by livestock reports to have actually cost.

123. **Western Mutton.**—It is one of the incomprehensible things in Western agriculture that so little attention is paid to the business of fattening sheep. With a vast country, as well adapted to making mutton as pork, and in many respects even better, it is one of the rarest things to see a farm devoted to the raising of sheep for their meat alone, while it is equally rare to find a farmer who does not raise hogs and fatten them for their pork.

We are aware that the West is full of sheep, and that the business is not considered very profitable. There are some good flocks—in fact, some large flock-masters, whose principal business is to raise sheep—but it is for their fleece alone. Very few farmers, East or West, have ever made a business of making mutton. The sheep are almost entirely bred for wool, not for meat. And besides this, more than one half of all the sheep in the United States are not bred distinctly for meat or wool, but simply because they are *sheep*, and will answer in some sort for both purposes; but their fleece is often of a coarse, unprofitable kind, and their bodies lean and light. Such sheep are naturally slow to acquire fat, when fed for that purpose, just as their fleece is naturally of light weight or coarse fiber. Such sheep are not profitable, although so common all over the country.

Of all varieties of domestic animals, the flesh of sheep is least used, except in cities, in proportion to the quantity that is, or rather might be, profitably consumed. We esteem mutton almost the very best kind of meat provided for a civilized people. That its production would be found among the most profitable we have no doubt, provided a good breed of sheep were selected, especially for their meat-producing qualities. For this purpose we esteem the Southdown variety the very best. We have known flocks of fat sheep of this sort sold here for $25 per head. Certainly this is a paying price. We have several times reported sales of sheep in New York, of the long-wooled kind, at $12 to $20 per head, which was equal to 12 to 16 cents a pound for the meat. Is this a profitable price for the farmer, particularly the farmer of the West, the greatest country in the world for the production of pork?

All the long-wooled varieties of sheep, known as Bakewell, Leicester, Cotswold, New Oxfordshire, etc., are fat-producing animals; that is, they are as naturally inclined to acquire fat as other animals are to produce only lean meat. In England, such mutton is much esteemed. In this country the lean kinds are preferred. In Ohio and other Western States there is a grade of sheep called common, that are as well fitted for the purposes of the Western farmer as any he could obtain in this country (except the Southdowns) to breed for mutton, if careful selections were made, and some care exercised in breeding and feeding. It is true they are a mongrel breed, made up of crosses of all the varieties ever imported, but they are strong and hardy and long-legged, which are valuable qualities for the drover. Their bodies, when well fatted, at two or three years old, will weigh from fifty to sixty-five pounds, and the meat is just fat enough to suit the American taste. The heavier carcasses of the long-wooled variety are generally too fat, though we think the taste for fat mutton is an acquired one, like that for fat pork.

But, fat or lean, mutton will always find ready sale in this city at remunerating prices. Western farmers should turn their attention more earnestly to the subject of raising sheep, not for wool, but meat for the supply of all the Eastern cities. We profess to be tolerably well acquainted with the great prairies of the West, and fully believe that there is no branch of agriculture so certain to produce sure and profitable returns as that of raising sheep of the kind we have indicated. We know of no other pursuit that the new settlers in Kansas could adopt at all to compare with this. Such a town, for instance, as Lawrence, might own a hundred thousand sheep, all of which should be kept out on the broad prairies in summer, under the care of shepherds and their dogs, to guard them night and day from their greatest enemy, the prairie wolf. In winter they could be provided for on a hundred farms, under cheap shelter, with earth walls and grass roofs. They winter well upon well-cured wild hay, without grain, except for those in hospital, if fed occasionally upon any kind of roots, such as can be grown in great abundance in that soil. In the fall or latter part of summer, select the best animals for market, and start them eastward across Iowa and Illinois, feeding them on cheap grain when the grass fails on the great prairie pasture.

The raising of cattle must be the business of Kansas settlers, and we believe the best of all will be mutton sheep. The new settlers, too, must for a time make meat their principal diet—in fact, it is the national diet of that region, just as vegetables are in China. We do not know of a greater act of folly, or a greater humbug, than inducing people to go to Kansas to practice the peculiar, not to say stupid, doctrine of vegetarianism.

What the people of the West want—what all who grow meat and all who consume it want—is to have the great sea of prairie grass converted into meat—cheap meat. This should be the leading object of all emigrants to the West. The business of grain-growing naturally belongs to a pastoral people, upon old farms, rather than to new settlers. It is a subject to be thought of both by emigrants and old settlers, which is the most profitable, stock or grain, and if stock, which particular kind.

124. **Sheep in Texas.**—There is, or has been, a sort of mania about sheep in Texas. The start made a few years ago by G. W. Kendall, and his success, after going through all the phases of ill luck, losses, and discouragements, which perseverance overcame, has induced many others to establish great sheep-farms in that State. Major Wm. Leland, one of the proprietors of the Metropolitan Hotel in this city, is one of the number who has followed the lead of Mr. Kendall, with every prospect of success. There is, besides the fine wool-flocks established in Texas, a constant and large importation

of the coarse-wool sheep of Mexico. It is estimated that a fourth of a million of Mexican sheep have crossed the line into Texas since the first of 1859, and the number is constantly increasing. These Mexican sheep are crossed with Northern stock, and make a valuable progeny, both for wool and mutton. We shall expect before many years more to see Texas mutton sheep in the New York market more frequently than we now see Texas beef-cattle, and that they will be much better liked, both by butchers and mutton-eaters, than the bullocks are.

A Massachusetts correspondent wants to know more than we do about sheep-farming in Texas. We commend him to Wm. Wilkinson, Comal Ranche, near New Braunfels, Texas.

We don't know "what part of the State is most suitable for sheep husbandry," but we do know that part of it is, as above indicated, for there George W. Kendall and others have succeeded.

"What breeds of sheep are to be chosen?" We can answer: All breeds that have succeeded in the Northern States have succeeded in Texas.

"What are the pecuniary advantages?" This question we can answer by stating that the first cost of land for a location is very small compared with the cost in Massachusetts, while there is a boundless range of open country upon which great flocks can be grazed, in charge of the shepherd and his dogs; and as for winter feeding, that is not worth mentioning, and the rudest shelters—mere earth walls—to break the force of the wind, will answer at first in place of costly barns. Subsistence, too, for hirelings, is also quite inexpensive, and, taken altogether, Texas certainly appears to have many advantages for sheep husbandry.

There are, to be sure, some drawbacks. It is a long way from the great center of commerce to which wool must be transported, and so far as we can see, it is so far away from mutton-eating communities, that the meat is nearly valueless. We very well remember, however, when the same thing was true of Ohio, where thousands of sheep have been slaughtered for the pelts and fat, and the meat fed to the pigs. Now, sheep are worth in Ohio within a dollar what they are in New York. Time may work a similar change for Texas, and then it will rival all other States as a sheep-producer, for that is a business that can and will be conducted without slave labor.

125. **Producing Twins.**—A large sheep-breeder has declared "that sheep highly fed with meal or other good provender, about the time the buck is with them in the fall, will almost invariably have two lambs apiece, and that these may nearly all be raised by proper attention to the mothers. The great mistake in regard to sheep is in not keeping them well enough. If you wish them to be prolific or profitable, give them plenty of the best hay through the winter, and meal daily, and for shelter a warm barn-cellar, wherein is an open tank of pure water. No kind of grain need be ground for feeding sheep—the hardest is thoroughly masticated and digested by them. The importance of good feeding is unquestionable."

It is by no means an unheard-of thing for all the ewes of a flock to average twins. An average of 130 per cent. to 150 per cent. is quite usual, and with some breeds a much greater increase is the general rule. The sheep offers her owner more sources of profit than any other animal. First, her natural increase; second, her wool; third, her flesh; and this is the most important of all the considerations connected with sheep husbandry, because a greatly increased consumption of the flesh of sheep will greatly promote health.

Sheep "come in play" wonderfully in well-managed farms, especially such as are pushed to their utmost capacity, as a means of increasing fertility in various ways, feeding off green crops, such as clover or rye, previous to plowing them under, securing thus the advantage of passing the crop through the animal system without moving it from the field, scattering the manure very evenly previous to plowing, and giving what remains of the green crop when plowed in the advantage of undergoing its decomposition in contact with animal excrements. The sheep possesses other and greater advantages over other kinds of stock, which recommend it for general culture. Among these is its great fecundity.

126. **Numbering Sheep.**—W. D. Dickinson, of Victor, Ontario Co., N. Y., gives, in the *Stock Journal*, the following plan of numbering sheep:

"About twelve years since I commenced numbering, classifying, and registering my flock, which has been of great advantage to me, enabling me to select at all times for sale (which I invariably do myself) such as are of the least value, whether with regard to age, weight of fleece, quality of wool, or value as breeders.

"My method of numbering is by notches in the ear, as follows: A notch in the fore part of the left ear stands for 1, one in the back part of the same for 3. With these I number up to 10; thus, two notches in the fore part, 2; two in the back part, 6; two in each, 8, etc. A notch in the fore part of the right ear stands for 10, one in the back part of the same, 30. With these I number to 100. This is as far as I have occasion to go in my flock, as I seldom have over 300, and consequently never have as many as 100 lambs of each sex in one year. This might be carried much farther by cutting off the end of the left ear for 100, and of the right for 200; a notch might then be made in the end of the left ear for 400, and in the end of the right for 800.

"The age of my sheep is known by the *holes* through the ears. A hole through the left ear stands for 1—that is, the year 1841, '51, or '61, showing the year in which the sheep was born; one in the right ear for 3, so that a sheep born in the year '56 would have two holes through the right ear; if in '57, two holes through the right and one through the left; for '58 would require two through each, instead of which I simply make a notch in the end of the left ear; and for '59, one in the end of the right. The years '40, '50, '60, etc., the ears are left without any holes—thus commencing anew every ten years, by which time those of that age are usually gone. I number my lambs as they are dropped, commencing each year with No. 1, both buck and ewe lambs.

"My book is kept in the following manner:

No. of Ewes.	Year born.	Class.	Live weight.	Weight of Fleece.	Buck used.	Yeaned. April.	Sheared. June.	Buck Lambs.	Ewe Lambs.	Remarks.
7	'51	3	84	6-1	34-53	12	11	1		
15	'51	1	93	4-1	39-53	13	26	2		
3	'54	2	83	4	51-53	13	24		1	

"In the first column is the number of the ewe; in the second, the year in which she was born; in the third, the class denoting the quality of the wool, which is regulated by the number of curves to the inch; the first containing 24 and upward; the second, 22 to 24; the third, 20 to 22; the fourth, 18 to 20. The fourth column gives the weight of the sheep when sheared; the fifth, the weight of fleece; the sixth, the number of buck used and the year in which he was born; the seventh, the month and day the lamb was dropped; the eighth, the time when the ewe was sheared; the ninth and tenth, the number of the buck and ewe lambs. My flock now numbers 267, principally breeding ewes and yearlings. My average weight of fleeces, when well washed, is usually about 4½ lbs., the quality of wool equal to medium Saxon, numbering from 20 to 28 curves to the inch, averaging about 24."

Another plan is given as follows, for numbering sheep, which, though not quite as permanent as the method detailed above, may be preferred by some persons on the score of humanity.

"We were handed a sheet of paper upon which was noted the weight of fleece of each sheep in the flock; opposite was set the number of the sheep, a corresponding number having been branded upon the animal itself at the time of taking its last clip, by applying a mixture of lampblack and tar with cast-iron figures. This course had been pursued for some years, and its results were apparent in a wool crop brought up from an average of four pounds to over five, and a corresponding increase in the size and quality of sheep. The practice had been to slaughter and otherwise dispose of all animals ranking lowest in weight of fleece and to improve upon the quality of the remainder by judicious crossing."

127. **Shearing Sheep.**—An old sheep-shearer, who can clip a sheep handsomely in three minutes, or shear and tie up the fleece in four minutes, who has often clipped 100 sheep a day, wants us to give our readers the benefit of his plan of doing it. First, have two pairs of good shears; one pair to trim with, and the other to do the principal work, and never use dull shears. A good oil-stone is the best sharpener. What is termed a down-set shear, with blades five inches long, he considers best. In using them, never draw the shears backward while making the clip, but rather push forward and keep the shears level and close, and never clip twice in one spot, as that cuts the wool.

To hold the sheep, have a bench as high as the lower part of the knee-cap; or if the sheep is large, it may be lower. Lay the sheep back to you, with head to your right hand. Put your right knee gently on the sheep's neck, with its right fore leg in the bend of yours as you kneel, having the sheep close to the edge of the bench, with its back braced against your left leg. Rest your left arm on the sheep's left flank, while you hold its right hind leg in that hand, stretched out to the edge of the bench, and holding to it if you wish, if the sheep is disposed to struggle.

Commence shearing at the opening on the left side of the breast, and trim off all the wool on the belly and inside of the hind legs, and remove it to one side till the fleece is off, when the trimmings of clean wool are to be wrapped in it.

To shear the body, place your left leg on the bench astride of the sheep, taking the jaws in your left hand, and clipping the foretop and right side of the neck, and down on the left breast. Then you change position, stepping back a little and raising the sheep on its hips, by catching hold of the left hind leg with your right hand without laying down the shears. Pull the sheep close to the edge of the bench and place your right leg between its hind legs, with its neck and shoulders on your left knee, as it rests on the bench. Now clip over the point of the shoulder, and then straighten the neck with your left hand, without stopping the shears, and finish off the brisket and the neck, and then clip on down the side, and over the hip and back, letting the sheep down gradually, so as always to have the skin you are clipping free of wrinkles. Now take your left knee off the neck, and hold it with your left hand while you remove your right leg and place the left one in its place, so that you can bring the right knee upon the bench, keeping the shears going all the time with the right hand. Then lift the head with the left hand, and clip that side over the point of the shoulder, and, raising the sheep gently, bring its head between your legs, while you finish clipping. Take care that the sheep does not struggle, and when done, lift it clear of the fleece, so as not to tear it. Fold the fleece with all the loose wool that is clean inside and roll it very snug, with the cut end of the wool out, and tie with cotton twine, so as to look neat and bear handling without getting loose and ragged.

Following the above directions, you will need to stop but twice for a moment to turn the sheep, so that the shears are almost incessantly clipping from the time you begin till you have finished.

128. **Tagging.**—One of the cares of sheep most important for their health and comfort is tagging, and this is most often neglected. Probably the only attention ever given to this matter is at shearing-time, and we have seen, even then, sheep sent off out of the shearer's hands with the tag-locks untouched. If there is anything in farming more slovenly than this, we don't know what it is.

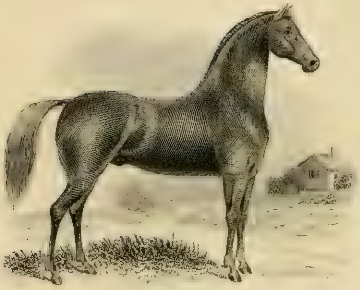
129. **To Cleanse Fine Wool.**—There are a few old-fashioned houses from which the spinning-wheel is not yet entirely abandoned. The inmates of such do not always know how to cleanse the gum out of Merino wool before sending it to the carding-machine. Let them be sure to remember this direction, by which we have cleaned many a hundred-weight, some of which was almost as black as my hat, with dirt and gum, characteristic of all fine-wool sheep.

PLATE VII.

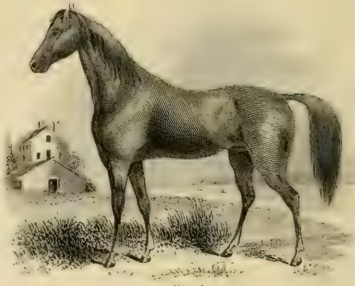
(Page 97.)

In this plate we present to the reader such a collection of excellent portraits of the most celebrated horses in America as can nowhere else be procured. The four upper figures will be at once recognized as correct likenesses of animals that have won a name that makes them famous in equine history. That of the Justin Morgan horse will be found in this chapter. He is the progenitor of a family that has won the hearts of the people. Flying Childers stands as the representative of the race-course. Patchen and Flora Temple are the most noted of the great family of American fast trotters. The Arabian here represented is a portrait of one of the noted horses presented to Hon. William H. Seward, and by him to the New York State Agricultural Society, and this picture gives one a good idea of the spirited appearance of that breed. The Cleveland Bay is the representative of a class of noble carriage horses which has given character to many of the same class in this country, particularly in Central New York.

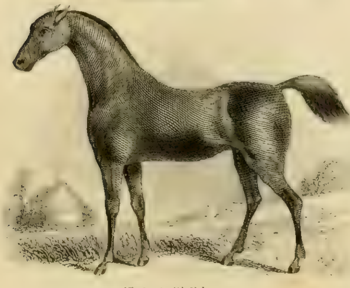
The Norman horse, as we see him here, gives a good idea of the appearance of the heavy diligence and common work-horses of France, having a thick neck, short, strong legs, and round, compact body, capable of sustaining great burdens, and pulling immense loads at a slow gait, as compared with some of our American fast horses. This breed was made quite notorious in this country by the importation of the late Edward Harris, of New Jersey, about twenty years ago. The portrait of the Canadian horse is a fine representative of his class, which was formed by a mixture of the Norman horses of the early French settlers of Canada with some smaller breed, which, by neglect and exposure, and carelessness of improvement in breeding, has produced a race of small, hardy horses, known as Canadian, which are sometimes, though erroneously, called ponies. A careful study of these portraits will be useful to all farmers, as well as many other persons.



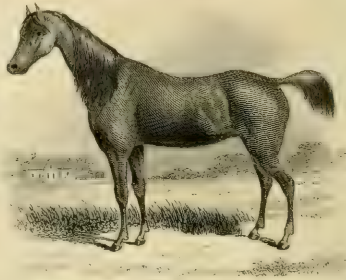
Justin Morgan



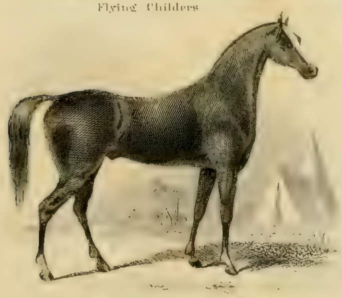
Patchen



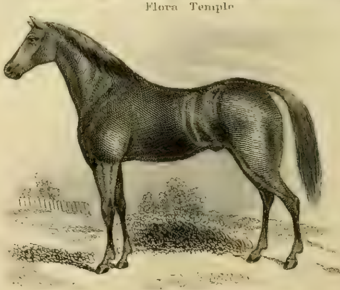
Flying Childers



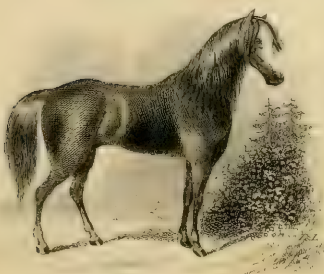
Flora Temple



Arabian



Cleveland Bay



Canadian

Norman Horse

For 100 lbs. of wool, take four gallons of urine and eight gallons of rain-water; mix and heat a little above blood-heat, until the scum rises, which skim off. Keep it at the same heat in a kettle on coals or a little fire out of doors. Put in what wool the kettle will conveniently hold, and let it remain about five minutes; take it out on a board that will drain the liquid back into the kettle, or else put it in a basket over a tub, so as not waste the liquid, for it will be equally good for the last batch as the first. When it is drained, put the basket under a stream of water running on it if convenient, or in a running stream if you can, or else with plenty of clear water in a large tub; it will wash very easily, and be as "white as wool."

Don't forget to sprinkle the dirty liquid upon the poorest spot in the garden, for it is a powerful manure.

The same kind of liquid is the best thing known to take the dirt and grease out of any kind of foul woolen clothes or yarn.

SECTION VIII.—HORSES AND MULES.

A GENERAL history of the horse and his uses, and how to use him, will not be looked for in a work that only professes to give little items of information upon a great many things. It would occupy a volume larger than this one to give a tolerably full history of the equine race, since it has been subjected to the use of man.

Equus is the generic name of the quadrupeds which have a single digit and hoof upon each foot, as has the horse, ass, zebra. The horse has been a domestic as well as a wild animal from a very early time. He is mentioned in Genesis as being in harness when Joseph transferred the remains of his father from Egypt to Canaan.

Horses exist in a wild state in various parts of the globe. They were once quite numerous in the territory embraced in some of our most western States. Domestication works material change, the most marked of which is an increase in the size of the trunk. Then follows an increased size of all parts, and a loss of the fleetness natural to the horse in his wild state.

The Arabian horse, though domesticated by a semi-savage race, still retains some of his wild characteristics, one of which is fleetness and long endurance. The Arab tradition in regard to the horse is, "that he was created out of the wind, as Adam was out of the earth." Hence, "fleet as the wind," is often applied to the horse. The tradition is, that the male of the horse was created first, as the more noble of the two, and that the horse was created before man, and after he was created he was told to choose the most beautiful of all animals, and he chose the horse; upon which God said to Adam: "You have chosen that which is a glory to you, and will be to your children." The Arabs profess to know the pure Arabian horse, the descendant of *Zad-el-Rakeb*, which Solomon presented to their tribe, by the firmness of his lips and cartilage of the lower part of the nose; by the dilatation of his nostrils; by the leanness of the flesh about the veins of his head; by the elegance of the neck and shoulders; by the softness of his hair, mane, and skin; by the fullness of his breast; by the large size of his joints; and by the dryness of his extremities; and also by his moral indications, for a noble horse has no malice in him. He loves his master, and frequently will suffer no other to mount him. He refrains from doing what nature prompts as necessary while his master is on his back. He will not eat food left by another horse. He loves to splash limpid water whenever he meets it. His instinct, smell, sight, hearing, intelligence, and address are all used for his master; and he will fight for him. Hence the Arab's love of his horse. It will be well for us all to remember some of the traditions of the Arab, for they describe valuable points in a horse.

130. **Thorough-Bred.**—This term does not appear to have any very definite meaning in this country. It is generally supposed to trace back to something in the way of pure blood, of a better stock than the common one of the country; but what that stock is, perhaps not one in ten who owns horses can tell. A writer in the (English) *Farmer's Magazine* says:

"The term thorough-bred is an expression not clearly defined as regards any of our domestic animals, but it would be very desirable to have some rule established. It may be accepted as a principle that breeding from animals endowed with certain properties and perfections through several generations, constitutes the claim to distinction; *but there is no adopted rule to determine how many generations are sufficient to establish the title.*"

Yet, according to our understanding of the term, a "thorough-bred" horse must trace back, free from contamination of baser blood, to the pure Arabian stock. The original of that stock in England, so far as pedigrees are attempted to be traced, was the "Darley Arabian," brought from "Araby the blest" by a Mr. Darley. That horse was the sire of Flying Childers, and grandsire of Eclipse, one of the most remarkable horses ever on the English race-course. He was not what would be considered a handsome horse, by a breeder of Morgan stock, but his fleetness and endurance were beyond competition, and his stock have followed in his footsteps. He died at the age of twenty-five years, after having begotten a greater number of prize-winning colts than any other horse that ever lived.

If a horse can trace back to old Eclipse, or any of his famous colts, there is no mistake about his being "thorough-bred." So he would be if he traces back to the "Godolphin Arabian," a Barb that was introduced into England at a later period than the Darley Arabian.

There should be some definite rule established among horse-breeders and our several State agricultural societies as to how far back and to what stock the pedigree of a horse should go to make him eligible to a prize as a "thorough-bred."

131. **English Hunters.**—This is a term given to a breed of English horses which are high up in thorough-bred blood, with a strain of other blood possessing great powers of endurance. The head of a hunter of perfect form is small; his neck thin, particularly below; a firm and arched crest; jaws wide, and very light on the bit.

132. **An English Coach-Horse.**—The type of this variety is the "Cleveland Bay," some of which have been imported into this country, and have left their mark upon the finest coach-horses we have in the United States—such as are to be found more abundantly in Central New York, than in any other locality.

133. **English Roadsters.**—The term more common for this class in England is "Hackney"—a term seldom heard in this country, and if heard, would be more likely to be understood as meaning a "hack-horse." The nearest type of a hackney that we have, as a distinct breed, is the Morgan horse.

Youatt says: "A hackney is a hunter in miniature. His hight should rarely exceed fifteen hands and an inch. He will be sufficiently strong and more pleasant for general work below that standard. He should be of a more compact form than the hunter, of more bulk according to his hight. It is of essential consequence that the bones beneath the knee should be deep and flat, and the tendon not *tied in*. The pastern should be short, and less oblique or slanting than that of the hunter or race-horse. The foot should be of a size corresponding with the bulk of the animal—neither too hollow nor too flat, and open at the heels. The forelegs should be perfectly straight; for a horse with his knees bent will, from a slight cause, and especially if overweighted, come down. The back should be straight and short, yet sufficiently long to leave comfortable room for the saddle between the shoulders and the *luck* without pressing upon either. Some persons prefer a hollow-backed horse. It is generally an easy one to go. It will canter well with a lady, but it will not carry a heavy weight, or stand much hard work. The road-horse should be high in the forehead, round in the barrel, and deep in the chest."

134. **The English Dray-Horse.**—There is a variety of horses known as the dray-horse, or more generally in this country as the English cart-horse; a very heavy, strong, slow-gaited horse, originated by a cross of the Flanders or Norman horse with the Suffolk Punch, a sorrel horse of fifteen or sixteen hands high, with low, rounded shoulders; thick on the top; low back; deep, round chest; long back; high croup; large, strong quarters; full flanks; round legs, and short pasterns. This is a good description of a strong work-horse. We have something like it, though rather increased in size, in the Pennsylvania wagon-horse.

135. **Morgan Horses.**—The most distinct strain of American horses—in fact, the only one which assumes the character of a race—is that now widely

known as the Morgan. The origin of this race is given in the following extracts from letters written by a son and a relative of the original owner of the old Morgan horse:

The following is an extract from a letter of Justin Morgan, originally furnished for the *Cultivator* (vol. ix., p. 99), dated Stockbridge, Vt., March 1, 1842. After stating that his father owned the horse from which the race of Morgan horses sprung, he says:

"I will now relate the facts relative to said Morgan horse as I recollect them. My father, Justin Morgan, brought said horse, or rather said colt, into Randolph, Vt., in the summer or autumn of 1795. Said colt was only two years old when my father brought him to Randolph, and had never been handled in any way, not even to be led by a halter. My father went to Springfield, Mass., the place of his nativity, and the place from which he removed to Randolph, in the spring or summer of 1795, after money that was due to him at that place, as he said; and instead of getting money, as he expected, he got two colts—one, a three-year-old gelding colt, which he led; the other, a two-year-old stallion colt, which followed all the way from Springfield to Randolph; having been, as my father said, always kept with and much attached to the colt he led. Said two-year-old colt was the same that has since been known all over New England by the name of the Morgan horse. My father broke said colt himself, and, as I have before remarked, owned and kept him to the time of his decease, which took place in March, 1798, and said horse was five years old the spring my father died; and, as before stated, soon after my father's decease, he passed from my father's estate into the possession of Wm. Rice, of Woodstock, Vt. I can not state positively that my father purchased said colt in Springfield, Mass., but I am very confident that he purchased him in that town or in the immediate vicinity, on Connecticut River."

We next offer an extract from a letter of John Morgan (see *Cultivator*, vol. ix., p. 110), in which it will be seen that the material points set forth by Justin Morgan are confirmed, and some further light given in regard to the blood of the first Morgan horse. John Morgan resides at Lima, New York, and is, we believe, a relative of Justin Morgan, Sr., and was a near neighbor of the latter previous to his removal from Springfield to Vermont. In reference to the colt above described by Justin Morgan (2d), John Morgan says: "He was sired by a horse owned by Sealy Norton, of East Hartford, Conn., called the 'True Briton, or Beautiful Bay.' He was kept at Springfield one season by the said Justin Morgan [Sr.], and two years after, I kept him two seasons. This horse was said to have been raised by General Delancy, commander of the refugee troops on Long Island, and rode by him in the Revolution. It was said that one Smith stole the horse from the General at King's Bridge, while the General was in the tavern; ran him across the bridge and took him to the American army, near White Plains, and sold him to Joseph Ward, of Hartford, Conn., for $300. It was also said at that time that he was sired by the imported horse called 'Traveler,' said to have been kept in New Jersey. Ward was a merchant, and kept the horse three or four years for a saddle and carriage horse, and then traded him off to Norton, and Norton kept him for mares while he lived. The description of the Morgan breed given by Mr. G. Barnard (*Cultivator*, vol. ix., p. 33), answers well to the stock of 'True Briton.' I have always understood that Morgan kept the colt for a stallion at Randolph, and was very celebrated for his stock."

The above statements of Justin and John Morgan comprise, as we believe, the true history, so far as it is known, of the origin of the far-famed Morgan horses. From the position of the Messrs. Morgan, they have had the best possible facilities for obtaining correct information on this subject, and we are not aware of anything which should hinder their statement from receiving full credence.

"Of the old Morgan's progeny, three became famous as stallions, viz., the Sherman Morgan, the Woodbury or Burbank, and the Chelsea. Of these the Sherman Morgan was greatly the most distinguished. I have ascertained to a certainty that he died in the winter of 1835. Black Hawk was sired by him."

136. **Black-Hawk Morgans.**—Fifteen years ago, S. W. Jewett, of Vermont, wrote of these as follows:

"I believe the Morgan blood to be the best that was ever infused into the 'Northern horse.' They are well known, and are esteemed for activity, hardiness, gentleness, and docility throughout the New England States; well adapted for all work; good in every spot, except for racers on the turf. They are lively and spirited, lofty and elegant in their action, carrying themselves gracefully in the harness. They have size in proportion to hight; bone clean; sinewy legs; compactness; short, strong backs; powerful lungs; strength and endurance. A mixture of the Morgan blood, though small, may be easily known from any other stock in the country. There is a remarkable similarity prevailing in all of this race. They are known by their short, lean heads, wide across the face at the eyes; eyes lively and prominent; open and wide in the under jaws, large windpipe, deep brisket, heavy and round in the body, broad in the back, short limbs in proportion to size, broad quarters; a lively, quick action; indomitable spirit; move true and easy in a good round trot; fast on the walk. Color: dark bay, chestnut, brown or black, with dark flowing wavy mane and tail; head up, and move without a whip; about fifteen hands high; action powerful and spirited.

"They are highly celebrated for general usefulness, make the best of roadsters, and live to a great age. In fact, they are the perfect 'Yankee harness horse.'

"The Morgans are very like the noble Arab, with similar eyes, upright ears, high withers, powerful quarters, hocks well placed under their weight, vigorous arms and flat legs, short from the knee to the pastern, close jointed, possessing immense power for their size, with great fire and courage. But a few of the Morgans, however, evince extraordinary speed.

"It is said that the best stock of horses in the New England States are found among the progeny and descendants of the Sherman Morgan, which was owned by Mr. Bellows, of Vermont.

"The figure given on another page is a portrait of Black Hawk, 'a colt of the Sherman Morgan, which was got by the old Justin Morgan horse. The dam of Black Hawk was a three-quarter-blooded English mare, raised in the province of New Brunswick. She could trot a mile in less than three minutes, and weighed 1,025 lbs., and was in every respect a most perfect animal.'

"Black Hawk was bred by Mr. Matthews, of Durham, N. H. He is a jet-black color; weighs, in good flesh, 1,040 lbs.; his hight is fifteen hands and one inch. A line drawn from the hip even with the ham, just below the setting on of the tail, is four inches longer than the back, or the distance from the hip to the withers. A line dropped perpendicular from the neck, parallel with the fore leg, is nineteen inches forward of the junction of the withers. The distance between the hip and the ribs is only one and a half inches. He has a broad and vigorous arm, fat and clean leg, large muscles, short from the knee to the pastern, large windpipe and nostril, well open when under motion. He is one of the best proportioned and most elegant moving horses that can be produced. He is perfectly sound, a close-jointed, clean-limbed animal, and carries a beautiful waving head, mane, and tail. His legs are flat and hard, clean from long hairs on the fetlock; his eyes stand out prominent; his disposition kind and playful. He keeps fat with very little feed of oats and bran, three quarts of each daily, and five or six pounds of timothy each day.

"No fault can be found with the horse, unless it be in his size; however, his stock are sufficiently large for roadsters and for general usefulness in this State."

137. **The Faults of the Morgan Horse.**—Of the Morgan horses as they were at the time Mr. Jewett wrote, particularly the Black Hawk strain of the blood, we have no fault to find—we rather indorse his statement. But fifteen years have wrought a change. As a general thing, Morgan horses have been bred too much in-and-in, and without regard to size. They are no longer "lofty" in proportion to the weight, but, on the contrary, are "squatty," and to the eye of a good judge of horses, far less attractive than they were formerly. What is needed, is an infusion of blood of a taller race —such as gave character to the Black Hawks. Wherever they have been crossed with Messenger stock, Cleveland Bay, or others of similar form, the improvement has been marked, and some of the very finest roadsters and carriage-horses have resulted. The Morgans, crossed upon other good breeds, do not improve those as much as it improves theirs. It is still a favorite breed of horses in New England, but not as much so as it was some years ago. The uniform color of the family has been a great recommendation, and there has been also a greater degree of general beauty in the Morgan family of horses than in any other ever extensively bred in this country.

We shall now give a few useful items for owners of horses of whatever breed, mongrel or thorough-bred.

138. **Driving—The Start.**—The first mile is the most important of the journey. More horses are injured in the start than in the balance of the whole day. You should carefully avoid rapid driving immediately after a horse has been full fed. Many old travelers feed over-night all the grain they intend the horse to eat in the twenty four hours. Others feed at night and at noon, and then give time after the horse has eaten his mess before starting, or else drive very slowly for an hour, making up time as night approaches. In all cases when a horse has been fed and watered an hour or two before starting upon a journey or drive of several miles, it is proper to drive slowly for the first mile or two; but when the feeding and watering have been more recent, the propriety of going along at a jog or easy pace is still more urgent. Colic, founder, broken wind, have all of them resulted from too rapid driving when a horse was full. A friend of ours, a physician, who had occasion sometimes to violate this dictate of good management in his haste to reach some case of great urgency, once informed us that when he drove at a rapid rate *immediately* after feeding, his horse would scour almost invariably, and seem to suffer considerably.

Even in such cases where a horse must be driven upon a full stomach, it is better to divide the distance into equal parts—say ten miles, which you intend to drive in an hour, and give forty minutes to the first half, and do the other five in twenty minutes. In that case be careful, when you stop, not to leave the horse to cool suddenly. If the weather is hot, and you have driven hard, don't mind trying to get your horse in a cool shade. The sun won't hurt him.

There is another great error in driving which has often been suggested to us. It is that of constantly urging a horse to exert himself beyond what is natural to him. For instance, if a horse is urged to perform in two hours a distance that he would, at his natural pace, require three hours to do, it will injure him more than four hours' driving at his regular pace; and if this urging is continued all day, he will break down, just as a man would, if urged to double his speed in walking.

139. **Size of Roadsters.**—A road horse should be about fifteen hands high (a hand being four inches), measured from the top of the shoulder or withers to the ground, when the horse stands naturally; his weight should be about 1,000 lbs.; for such weight in an animal fifteen hands high, in moderate flesh, indicates compactness and power *somewhere.* Experience has proved that horses of this size carry their weight better on long journeys, injure their feet less on the pavements and hard roads, and are apt to be more fleet than those of a larger class; for while greater length and hight will give an increased stride, either running or trotting, the power to gather rapidly, and especially for long distances, requires much greater muscular exertion in large than in small horses, from the greater weight to be propelled. Our fastest trotters have generally been from this class.

140. **Walking Horses.**—The best gait a horse ever had for every-day use is a good walk. It is a gait that not one in ten possesses. Colts are not trained to walk in all the Eastern States. Young America wants more speed. Kentucky has more good walking horses than any other State, for there horseback traveling has long been in fashion for men and women over a country where muddy roads, at some seasons, rendered any other gait impossible, and so horses have been bred for the saddle and trained to a walking gait. This is also the case in all the Western States, and perhaps might have been so in New England, when our grandmothers rode to meeting on a pillion behind our grandfathers. But one-horse wagons have put horseback riding out of fashion, and now a good walking horse is more rare than one that can trot a mile in 2.40.

At the Springfield (Mass.) horse show of 1860, the writer was one of a committee to award prizes to the two best walking horses. Out of seventeen entered, the committee found but one which was considered a first-rate walker. This was a Morrill mare, which walked five miles an hour with ease. Two others were fair walkers, and the others knew no gait that could be called walking. At the New York State Fair the same state of facts was again developed. A letter from Wisconsin says: "I think horses trained to walk fast would be a greater benefit to farmers in general than fast trotters, as almost all of his work has to be done with a walk. I once knew a man in Massachusetts who, before the railroads were built, kept from two to four teams at work on the road, and never allowed them to trot at all, and made the distance in quicker time than his neighbors, who made their horses trot at every convenient place. He said that when a horse commenced to walk after a trot, he walked much slower than his common gait if kept on a walk, and thereby lost more than he gained." Will farmers think of this, and pay more attention to walking horses?

141. **Instruments of Torture Used by Horsemen.**—The following sensible remarks are from the *Irish Farmer's Gazette.* They are quite applicable here:

"The good old English roadster's style of walk, trot, or canter is too steady for your fast young man; he thinks it far beneath him to speak a kindly word to his horse, or to control him by an easy signal; and however quiet the horse may be, he is rarely seen on his back without at least *four* unnecessary instruments of torture—namely, two spurs with sharp rowels, one whip, and a severe curb bridle. Why should it be the universal custom in this country for men armed with these cruel instruments of torture to ride quiet, docile horses, and often punish them for a fanciful fault which they themselves bring about by their own want of experience and knowledge of the horse's nature?

"If a man has not the ability to handle a horse lightly, and at the same time keep his balance in the saddle, he has no business to ride one of value and high courage. It would be better for the horse and safer for the man to keep his feet on terra firma.

"The more a horse's mouth is used to a severe bit, the less he will care for it, as he will soon learn to neutralize its effects by *pulling* and keeping the reins in a state of tension, and thereby prevent the rider from checking or wriggling the bit—to punish him. The dead, steady pull is far less painful to him than the jaw-breaking the rider would be able to inflict upon him if allowed to keep his reins slack and ready for a jerk.

"One of the many causes which makes pulling horses is the unsteady seat of their riders. Many men can not ride a *light-mouthed* horse, but they can sit a *puller* with ease, because the firm hold this horse allows them to have on the reins is the main thing upon which they depend to keep their balance.

"I have seen the most inveterate pullers in some people's hands ridden in bits invented by their owners, regular jaw-breaking or choking power, and still pulling so hard as to tear the skin of their rider's hands. And I have no hesitation in saying—having frequently proved my assertions by practice—that if one of these tear-away pullers changed hands, and his new owner would bridle him with an easy snaffle, and let him stand in the stable—to feel the difference—an hour before he was mounted he would forget his old habit."

142. **Saddle-Horses.**—One of the meanest things ever taught a saddle-horse is to cavort and curve, and go dancing and prancing about as though trying to keep within a circle just large enough to hold his four feet closely drawn together. If you are selecting a saddle-horse, see that he does not stand square upon his forward feet. They should reach well forward, and then there will be such an easy spring that you may ride at a smart trot without feeling as though you are struck with a sledge at every step, as you may upon some horses whose hoofs are square under the legs, and appear to have about the same degree of spring that you would have upon wooden pins stepping along, and brought down at every step like a pavier's rammer. Never select a very round-backed horse for the saddle. It does not hold its place well upon such a back. A good saddle-horse must possess good sense as well as a good gait and gentleness.

143. **Color Indicative of Gentleness.**—It is asserted that the reason why circus managers select parti-colored horses is not their fancy color, but because it indicates gentleness and tractability, and that the animals will submit to training better than horses of one color. A little thought and observation upon this subject will enable any farmer to settle the question in his own mind. Perhaps there is more than appears at first view in the common expression, "a fiery black horse." Is it not because black indicates a fiery temper? Independent of color, we would look in the countenance of a horse to see whether he would bear training. In some animals there is a general appearance of an ugly disposition. A face broad and full between the eyes indicates good sense, which is one of the most important things in a horse.

144. **Horse Stables** should be light, roomy, and well ventilated. Never put a horse in a cellar. Build your stables high; that is, high between floors. Most stables are built low "because they are warmer." But such

people forget that warmth is obtained at a sacrifice of pure air and the health of the animal. Shut a man up in a tight, small box; the air may be warm, but it will soon lay him out dead and cold if he continues to breathe it. If stables are tight, they should have high ceilings; if they are not tight, but open to admit cold currents of air from all directions, they are equally faulty.

Slatted floors are getting into vogue. My own stable is built with a tight floor nine feet long and four and a half feet wide for each stall, with a pitch of two inches. At the end of the plank there is a slatted portion, four feet wide, two inches lower than the plank. Through these slats all the urine runs into the manure pile in the cellar, and so leaves the beds of the horses dry.

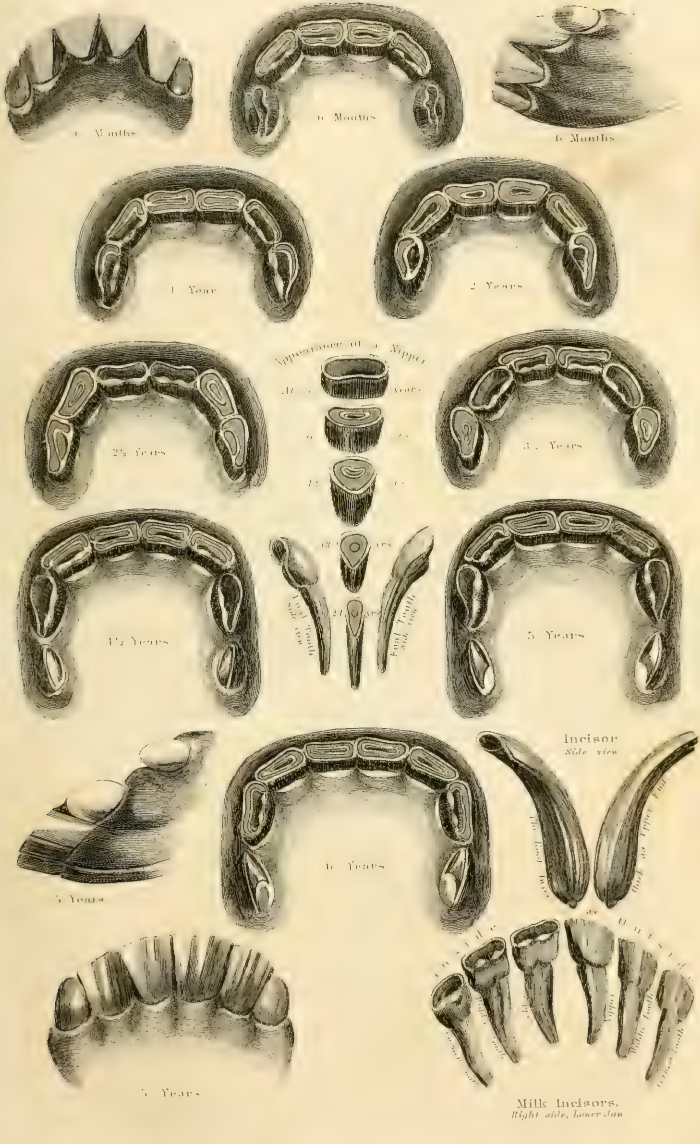
145. **Sand for Horses' Beds.**—Mr. Small, of Dundalk, Scotland, a veterinary surgeon of considerable experience, states that sand is not only an excellent substitute for straw for horses' beds, but superior to straw, as the sand does not heat, and saves the hoofs of the horses. He states that sand is exclusively used for horses' beds in his repository.

146. **To Remove Horses from a Building on Fire.**—The great difficulty of getting horses from a stable, where surrounding buildings are in a state of conflagration, is well known. Wilkes' *Spirit of the Times* says, a gentleman whose horses had been in great peril from such a cause, having in vain tried to save them, hit upon the experiment of having them harnessed, when, to his astonishment, they were led from the stable without difficulty. Throwing a blanket over a horse's head will often answer, also, and may be easily tried before harnessing.

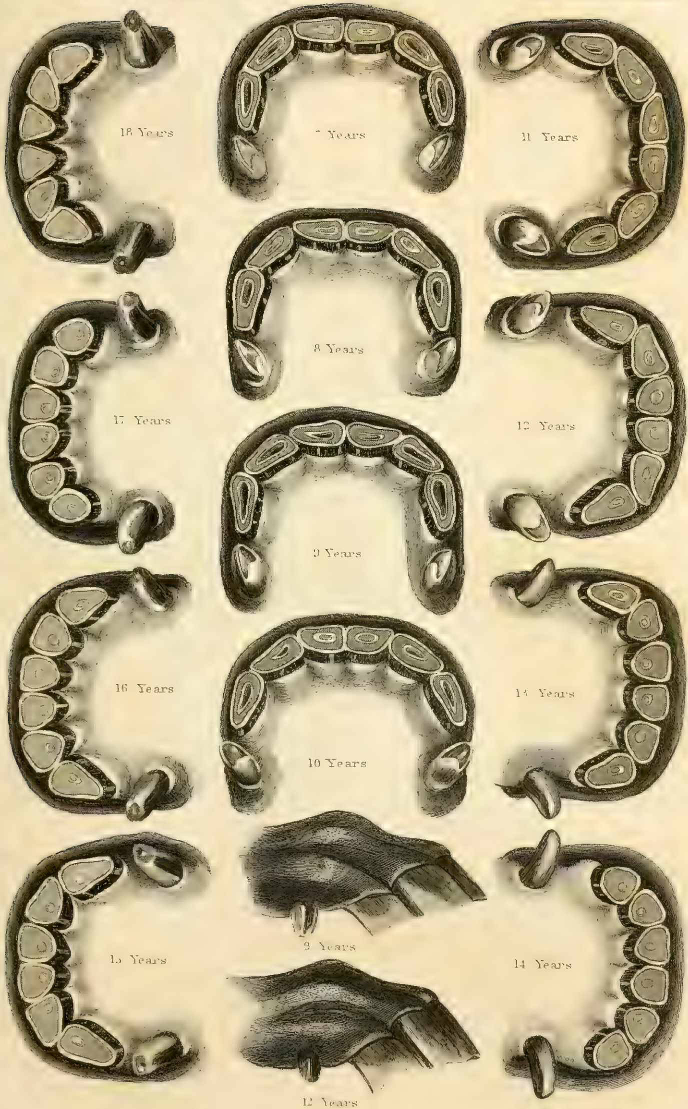
147. **Proportion of Horses to Men.**—The following curious account is given in Appleton's Encyclopedia, of the number of horses in the various parts of the world: "The general estimate has been eight to ten horses in Europe for every hundred inhabitants. Denmark has 45 horses to every hundred inhabitants, which is more than any other European country. Great Britain and Ireland have 2,500,000 horses; France, 3,000,000; Austrian Empire, exclusive of Italy, 2,500,000; Russia, 3,500,000. The United States have 5,000,000, which is more than any European country. The horses of the whole world are estimated at 57,420,000."

148. **What Constitutes Legal Unsoundness in Horses.**—*A Knee-sprung* horse can hardly be said to be unsound. He may be a very fast horse, and can endure with ease the labor of any common, ordinary horse, although there is an alteration of structure which unfits him for the race-course. This would not be likely to produce disease or lameness; he would be more likely to grow better than worse, if used for common purposes. But if so bad as to produce stumbling and falling, he would be unsound, and a warranty should be taken against such *defects*.

Capped Hocks can not be considered unsoundness, if produced by an uneven stable floor or by kicking; but if produced by a sprain, and a permanent thickening and enlargement of the membranes, there would be unsoundness. A special warranty should be required in such cases.



HORSES TEETH AT DIFFERENT AGES.



HORSES TEETH AT DIFFERENT AGES.

PLATES VIII., IX.

(Pages 106, 107.)

These plates need no description; they require study. As they contain all that could be said to fully understand the subject illustrated, we have written nothing about the art of "telling the age of horses by examining their teeth." Whoever studies these plates will learn that art. Observe the steady change, year by year, as it is mapped out before you. Open the mouth of your horse, and compare its appearance with the illustration of the year corresponding to his known age, and so on of all others. Thus you will learn the art and the value of these engraved representations.

Contraction of the Hoof is a considerable deviation from the natural form of the foot, but does not necessarily constitute unsoundness. It requires, however, a most careful examination by the purchaser to ascertain that there is no fever or ossification of the cartilage; that the frog is not diseased; that the animal is not tender-footed or lame. Unless some of these symptoms are indicated, he must not be pronounced unsound. A special warranty should be required where the feet are contracted.

Corns manifestly constitute unsoundness. Although few men lay much stress on this malady, still much inconvenience, and many times serious difficulties, must be encountered by them, as they are seldom thoroughly cured. Many horses are almost constantly lame with corns, through a scrofulous habit of the system. A warranty against such animals would be safe.

Trembling Knees.—This can not be considered unsoundness, yet it is a precursory symptom of *knee-sprung.* Trembling of the knees, after a smart exercise, indicates weakness, and should be regarded as objectionable.

A Cough constitutes unsoundness, however slight or of short standing. If a horse is noticed to cough before the purchase, or immediately afterward, he is diseased; but if warranted sound, and the cough is not discovered till one or two days afterward, he is not returnable; for a few hours are sufficient to contract a cough, by taking cold while standing in a damp, musty stable, or by eating different feed, musty hay, etc.

Roaring, Wheezing, or *Whistling* is unsoundness, being the result of alteration of structure or disease in the air-passages. Although there have been decisions to the contrary, courts and jurors are often at a loss for the want of intelligent witnesses; and if a veterinary surgeon is called to the stand, not having seen the animal, he is liable to be mistaken from misrepresentation. *Broken Wind* is still more decidedly unsoundness.

Crib Biting.—A difference of opinion exists as to this being unsoundness, and courts have given opposite decisions in respect to it. There are cribbers that can scarcely be said to be unsound, as they are not perceptibly injured, and it does not interfere with their condition or endurance. Others inhale and swallow a great amount of wind; they bloat and are subject to colic, which interferes with their health and strength; this would constitute unsoundness. A warranty should always be taken against injury from cribbing; then if he breaks his teeth or injures himself, recompense may be had.

Curb constitutes unsoundness as long as it lasts, and perhaps while the swelling remains, although no inflammation exists; for a horse that has once thrown out a curb, is liable to do so again on the slightest exertion. A horse, however, should not be returned if he spring a curb five minutes after purchase, for it is done in a moment, and does not indicate any previous unsoundness.

149. **Soiling Horses.**—We commend the following statement of J. C. Adams, of Seymour, N. Y., to the attention of all owners of small farms, like the little one where we practice the same course:

"I have in close proximity to my barn a patch of ground, 7½ rods by 16 (three quarters of an acre), seeded to clover, from which I kept one span of horses in thriving condition from the first day of June last to the last day of August, besides cutting 900 lbs. of good hay, which I put into the barn, and harvested of the second mowing seed sufficient to stock an acre or two of ground. This may, and undoubtedly will, seem to many like a big barn well stretched. In fact, I should doubt the reality of such a story myself, had not my eyes seen and my hands felt the truth of such a statement. By the time I had mowed two thirds of this little patch, the remainder was fit to be made into hay, which I accordingly did up after the most approved fashion. And that part mowed first was sufficiently large to mow again. I fed them three times a day all they could eat. They smelt not, touched not, tasted not one particle of grain during the three months; used them more or less every day, and at the end there was a perceptible gain in flesh. Never, since I could say *my* team, have I summered a team so cheaply. The greatest cost is cutting and putting it before the horses. I offered them water, but they did not drink to exceed a pailful a week.

"I am of the opinion that if they had been turned loose upon this piece of ground, ten days would have been sufficient time to eat up and trample into the earth everything green upon it. As five acres of good pasture is little enough to summer a span of horses when allowed to run, there is almost an incalculable saving in soiling them."

150. **Breeding for Longevity.**—We have had a few instances of horses living to the age of thirty years, but they are so rare, that such an old horse is looked upon as a curiosity. Lewis B. Brown, of Westchester County, N. Y., has a team of four, the aggregate age of which is 108 years, the oldest being over 30 years, and all in such vigor of constitution that but few teams can hold their own with this upon the road. The exhibition of this old team at the Springfield show, in 1860, attracted universal attention. This shows that such old horses are rare, and it proves that old horses are not worthless. It also induces the question, whether we can not breed with a special reference to longevity. If selections were made upon both sides, of stock which had ancestors noted for longevity, and this course continued through several generations, with mares and stallions which have arrived at mature age, still retaining a vigor like that exhibited in Mr. Brown's team, who can say that we should not obtain a breed noted for longevity, and that horses forty or fifty years old would then be no rarity? This is a subject worth thinking about.

151. **Treatment of Colts.**—When first foaled, if parturition is at maturity, the colt should have eight front teeth, four in each jaw; but it sometimes happens that these are not all cut through, and the gums are inflamed and so tender that the colt can not suck well. This should always be looked to, and the gums cut with a sharp knife, and, if need be, the colt fed until it can suck freely.

Colts as well as calves are sometimes affected by lice; these may be got rid of in various ways. Take white-oak bark, boil it in water, making a strong decoction; wash the animals on the back and on the sides. In twenty-four hours the lice will be completely tanned. Tanner's oil is also first-rate. So is snuff or a decoction of tobacco; and we have heard of Peruvian guano being used and answering the same purpose as snuff.

152. **Remedies for Some of the most Common Diseases of Horses.**—There are a great many little simple complaints that can be cured without sending for a veterinary surgeon. We can afford room for only a few, because every farmer should take an agricultural paper, and such papers are stored with valuable remedies such as the following:

153. **To Cure Scratches.**—When the horse comes in at night, his legs should be washed clean and rubbed as dry as may be; then apply good vinegar, rubbing it well to the skin. Two applications a day are sufficient. I have always found it a sure preventive and a certain cure. If the legs have become cracked and sore, apply the vinegar freely and add a piece of copperas the size of a common hickory nut to a quart of vinegar.

Another excellent remedy, which we have used a great many times, is beef brine. If the dirt is carefully washed off with warm soap-suds, and then the legs well bathed with the brine, it will require but two or three applications to cure a very bad case of scratches.

The *Maine Farmer* gives another remedy. It says: "Take fresh slaked lime, and dust the affected parts well with it twice a day. It will not cause the horse any uneasiness, and will be sure to effect a cure in a few days.

154. **For Heaves in Horses.**—Take smart-weed, steep it in boiling water till the strength is all out; give one quart every day for eight or ten days. Or mix it with bran or shorts. Give him green or cut-up feed, wet up with water, during the operation, and it will cure.

155. **Chafing Under the Collar.**—A gentleman who has tried the plan successfully for five years, communicates the annexed method of preventing horses from chafing under the collar. He says he gets a piece of leather, and has what he terms a false collar made, which is simply cutting the leather in such a shape as to lie singly between the shoulders of the horse and the collar. This fends off all the friction, as the collar slips and moves on the leather, and not on the shoulders of the horse. Chafing is caused by friction, hence, you see, the thing is entirely feasible. Some persons put pads or sheep-skins under the collar; these, they say, do as much hurt as good, for they augment the heat. A single piece of leather, like that composing the outside of a collar, without any lining or stuffing, is better than anything else.

156. **For Fistula.**—Salt, one tablespoonful; soft soap, one tablespoonful; whisky, one tablespoonful; turpentine, one tablespoonful. Mix in a tin cup; place on the horse's nose a twitch, to prevent his moving; have your mixture placed on a little fire, and as soon as it boils up, pour immediately upon the diseased part; repeat the operation every ten or twelve days, till applied three or four times, if necessary. It will not take off the hair or leave any scar.

This is not more effectual than the following much simpler remedy, which we have proved for both fistula and poll-evil. Take a lump of potash or saleratus, as big as you can crowd into the pipe of the fistula, and it causes it to discharge more freely for a day or two, and then it begins to heal. In one case of poll-evil, a large mare would not allow any one to touch her head to apply the remedy, or in fact to be bridled. For this case we took about two ounces of saleratus and tied it in a cloth, in the form of a pad, inside the strap of a halter, where it crossed the top of the head, and by dint of perseverance succeeded at length in getting it on and firmly secured, when we bid her go and live or die, as she liked—we would do no more for her. A shower fell soon after, and the next time we saw our patient she was partially healed: the caustic had taken the hair off, and it had also affected the disease. A fortnight later we caught her, and found she did not object to being handled. The disease was cured, and the mare was worth a hundred dollars. When turned out, she could not have been sold for a hundred cents, and the cure had not cost five cents.

Here is another remedy which may be tried, if it is preferred to the other. The following is sent us as a valuable prescription for several of the ills that horse-flesh is heir to, such as fistula, poll-evil, ring-bone, big head, etc.: 12 oz. of alcohol, 1 oz. of spirits of turpentine, 1 oz. of corrosive sublimate, 1 oz. of camphor gum, 1 oz. of oil of spike, 1 oz. of castile soap, 1 oz. of aquafortis—mixed and dissolved, and applied with a swab for a day or two, and then intermixed, and apply again. Take care only to touch the part affected; and, to prevent injury to the hair or hoof adjacent, rub it well with grease.

157. **White Lead, its Value on Sores.**—*White lead in oil*, as an external application or remedy, has no equal. In abrasions, or galls from the saddle or collar, or from any other cause, it will speedily aid the part in healing. Applied to the leg of a horse—the outer coating of hair and skin of which was torn off—with a painter's brush, caused it to heal and leave no scar. It is good for scratches and all sores upon horses or other animals, and equally good for men. It forms an air-tight coating, and soothes pain. Every farmer should keep a pot and brush ready for use, and he should not fail to apply it to all abraded spots on tools, as well as stock. White lead is the carbonate of the metal, and, when pure, is very white. That having a grayish tint is impure, being generally adulterated. For use as a paint, a lead color is produced by adding lampblack, and a drab or stone color, by adding burnt umber.

158. **Liniment for Sweeney in Horses.**—One oz. of oil of spike, 1 oz. of oil of amber, 1 oz. of Venice turpentine, and a small quantity of rock-oil.

159. **Blind Staggers.**—This disease is more common in the Southern than it is in the Northern States. The *Cotton Planter* newspaper gives the following remedy: "Take 1 gal. of green hickory wood ashes, 1 half pint of spirits of turpentine, 1 oz. of gum camphor, and a sufficiency of lye to make a thin mush. Fill a horn with this mush, while boiling hot, and with a thin

cloth stretched over the end of the horn, apply it four times upon or over the region of the brain, each time filling the horn with the boiling mush, which will blister the skin. In connection with this, it is necessary to burn rags wet with spirits of turpentine under the horse's nose until you produce a free discharge. You should also bleed freely from the neck, and give one pint of linseed-oil as a purge.

160. **How to Detect Imperfect Vision or Blindness in Horses.**—You may have good grounds for suspicion of imperfect vision when the horse moves his ears in a constant and rapid motion, directing them in quick succession to every quarter from whence the least sound proceeds. Also if his action is lofty and faltering, and he lifts up his feet and replaces them on the ground as if stepping over some obstacle, when there is actually nothing to impede his free progression, notwithstanding these symptoms would be sufficient to create suspicion, there are other causes by which similar symptoms would appear in horses. If a horse with perfect eyes were led from a dark stable into the sunshine, the sudden contraction of the pupil of his eye would render it impossible, for a few moments, for him to see but very indistinctly; hence symptoms of uncertainty in his movements, until the pupil becomes steady after the sudden contraction. The dilating and contracting of the pupil furnish means of ascertaining whether blindness exists in one eye or both, as this pupil varies in size according to the degree of light which is brought to bear upon it. In a dark stable the pupil is expanded, so that a greater portion of light falls upon the cornea; but if the horse is led to the door of the stable, the pupil will contract so as to exclude more light than could be endured, and if suddenly exposed to the sun, the aperture will be all but closed; therefore carefully notice the eyes, whether they contract or expand equally by the increase and decrease of the light. If the horse should be examined in the open air, notice whether both pupils are of exactly the same size. After this, carefully place the hand, so as not to alarm the horse, over each eye, to shade off the light, and hold it there for a short time, noticing the extent to which the pupil dilates; then pass the hand over the other eye, and ascertain whether it also dilates to the same extent, and if still it be uncertain, place both hands in the positions of shades over both the eyes of the horse, and you will at once perceive whether they are perfect, and if not, which of the two is imperfect.

Nothing tends more to injure the eyes of a horse than dark or badly ventilated stables. Attention to the lighting, draining, and ventilation of horse stables is an imperative duty. There are thousands of stables in which the door is the only aperture for the ingress or egress of pure air, and even this is in most instances closed, both when the horse is at rest, or at work or exercise; thus he has, while in the stable, to constantly breathe vitiated air.

161. **Remedy for Galls on Horses.**—Use whisky, saturated with alum, to wash the parts liable to chafe, which tends to harden the skin and prevents its rubbing off. For galls already formed, the following receipt for a salve is good; so it is for human flesh-sores.

"Take of honey, twelve ounces; yellow beeswax, four ounces; compound galbanum plaster, six ounces; sweet oil, half a pint. Put the honey into a jar by the fire, then melt the other ingredients and mix them together; spread very thin on linen, and apply twice every day."

162. **Horse-Shoeing.**—It is wonderful how little the mass of smiths who shoe horses know of the anatomy of a horse's foot; of its delicate organization, and susceptibility to injury by improper paring of the hoof, formation of the shoes, and attachment of the same! Horses are peculiarly sensitive to lameness, and it is obvious that great care in the particulars mentioned should be observed, in order that a firm, positive, and comfortable tread should be given the feet, so as to make them capable of exerting the wonderful degree of muscular strength of which they are possessed without injury to the exquisitely constructed parts which are brought into play. In one of the numbers of the *Dublin Agricultural Review* we find a long article, written by William Miles, extracted from the Journal of the Royal Agricultural Society of London. We heartily commend this able production to the perusal of those of our readers interested in this important subject. It commences as follows:

"If I were asked to account for my horses' legs and feet being in better order than those of my neighbors, I should attribute it to the four following circumstances: First, that they are all shod with few nails, so placed in the shoe as to permit the foot to expand every time they move; secondly, that they all live in boxes instead of stalls, and can move whenever they please; thirdly, that they have two hours' daily walking exercise when they are not at work; and fourthly, that I have not a head-stall or rack-chain in my stable. These four circumstances comprehend the whole mystery of keeping horses' legs fine, and their feet in sound working condition up to a good old age.

"All that is really required is, to take one anatomical and one physiological fact on trust, and believe that the horse's hoof is lined by a very sensitive membrane which must on no account ever be wounded, and that the hoof itself is elastic, and expands when the weight of the horse is thrown on the foot, and contracts when it is taken off again; all the rest is purely mechanical, and merely calls for the exercise of a little thought and patience to understand the principle and apply it.

"The result of the numberless experiments I have made at various times on all sorts of horses doing every kind of work is, that there is but one principle to be observed in horse-shoeing which will admit of no variation or compromise: the shoe must fit the foot, whatever the shape of the foot may happen to be, and it must be nailed to the hoof in such a manner as will permit the foot to expand to the weight of the horse; this latter condition will be best complied with by placing three nails in the outer limb of the shoe, and two in the inner limb between the toe and the commencement of the inner quarter; a larger number than five nails can never be required in any shoe of any size, or under any circumstances, excepting for the sole purpose of counteracting defective and clumsy fitting.

"No horse should have more than one foot bared at a time; however strong his feet may happen to be, he is sure to stand quieter on a shod foot than he can on a bare one, and it will prevent his breaking the crust. A horse with weak flat feet is in positive misery when forced to sustain his whole weight on a bare foot, while the opposite foot is held up.

"A strong foot with an arched sole, when the roads are in good order, will require to have the toe shortened, the quarters and heels lowered, and the sole pared, until it will yield in some slight degree to very hard pressure from the thumb; but on no account should it ever be pared thin enough to yield to moderate pressure; the angles formed by the crust and the bars at the heels must be cleared out, and all the dead horn removed therefrom, and the bars should be lowered nearly to a level with the sole.

"A weak flat foot, on the contrary, will bear no shortening of the toe, and very little paring or lowering anywhere; the heels of such feet are sure to be too low already, and the sole too thin; in fact, the less that is done to them the better beyond clearing out the dead horn from the angles at the heels, and making the crust bear evenly on the shoe; but the hollow between the bars and the frog, or the frog itself, must never be touched by a knife in any foot, whether it be a weak one or a strong one; and as these latter directions differ materially from the usual practice of smiths, I may, perhaps, be expected to state my reasons for wishing to enforce them in opposition to what they no doubt consider a time-honored custom; I mean the inveterate habit they all have of trimming the frog, and opening out the heels at every shoeing; but I think I shall be able to show that 'it is a custom more honored in the breach than in the observance.'

"The shoe should be neither too light nor too narrow in the web; light shoes are apt to bend before they are half worn out, and narrow-webbed shoes expose the sole and frog to unnecessary injury from stones in the road. Every fore-shoe should be more or less seated on the foot-surface, to prevent it pressing on and bruising the sole; but a perfectly flat surface should be preserved around the edge of the foot-surface of the shoe, from heel to heel, for the crust to rest upon. The amount of seating to be employed must be determined by the description of foot to be shod; for instance, a broad foot, with a flat sole and weak horn, will require a wide web, considerably seated, to prevent it coming in contact with the sole and bruising it; but a narrow foot, with an arched sole and strong horn, will require less width of web and less seating, otherwise the dirt and grit of the road would become impacted between the shoe and the sole, and cause as much pressure and injury as the iron would have done."

Many men who own and use horses seem to be indifferent as to the manner in which they are shod, so much so that they take them to any one who can drive a nail, leave everything to him, and take it for granted that if the horse has got four good stout shoes on his feet that will stay on as long as they last, it is all right. This is a great mistake, and will often lead to the discomfort and ultimate ruin of the horse.

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No horse that is badly shod can travel easily, safely, or well; and many who use horses that cut their legs or trip, suppose that the fault is in the horse, while in fact no one is in fault but the shoer. There are hardly two horses that require precisely the same shaped shoe, or that it be put on in precisely the same way; hence to shoe every horse so as not to pinch, and consequently injure the feet, and at the same time so that he can perform his work easily and well, requires considerable experience and more than common skill and intelligence on the part of horse-shoers.

One of the objects in applying the shoe is to preserve the natural concavity of the sole of the foot. A horse in his natural state, and, indeed, up to the period of his first introduction within the precincts of the "smithy," has generally a concave sole; and wisely is it so ordained. Were it otherwise, the animal would be unable to secure foothold; as it is, the inferior edge of the hoof—that is, the ground surface—projecting beyond the sole, may be compared to the point of a cat's claw or the nails of a man; they grasp, as it were, bodies with which they come in contact, and thus secure a point of resistance which aids in advancing limb or body over a smooth surface. Now, in order to preserve the natural mechanical functions of the horn and sole, the ground surface of the shoe must correspond to the ground surface of the foot; that is to say, the ground surface of the shoe must be beveled cup fashion; its outer edge being prominent, takes the place of the hoof; its inner surface being concave, corresponds to the natural concavity of the foot. It is a custom among some blacksmiths to reverse the above procedure, and place the concave surface next the foot, and often the ground surface appears to be more *convex* than concave. An iron shoe tacked on to a horse's foot is one of the unavoidable evils of domestication, yet, when properly applied, is not so great an evil as some persons might suppose.

R. Jennings, veterinary surgeon, Philadelphia, gives his views as follows upon this subject:

163. **Contraction of the Feet of Horses—The Cause and Remedy.**—"The tendency of a horse's feet, in a healthy condition, is to expand whenever the weight of the body is thrown upon them. Being a very complicated piece of mechanism, they are very easily disarranged, and, once out of order, are difficult of repair; hence the necessity of preserving them in a sound condition.

"*Contraction is caused*, 1st, by cutting away the bars of the feet, which are the main stays for the support of the quarters; 2d, by (opening the heels, as the smith calls it) cutting away a portion of the frog, in consequence of which the moisture of the frog becomes absorbed, losing its elasticity and destroying its function, thus exposing the feet to injury by concussion; 3d, by standing upon plank floors; 4th, by improper shoeing.

"An ordinary observer will, upon an examination of the common shoe, notice that it inclines from without inward at the heels, thus forming a concavity for the feet to rest in; the consequence is a lateral resistance to the expansion of the hoofs when the weight of the animal is thrown upon them.

The effects of this resistance are to force the heels together, creating pressure upon the sensitive parts within the horny case; establishing fever, by which the moisture of the hoofs is rapidly absorbed, rendering the hoofs hard, brittle, and liable to crack, and frequently causing corns, navicular joint lameness, bony deposits to be thrown out from the lateral wings or processes of the coffin bones, rendering the animal permanently lame or unsound. These are but few of the bad effects arising from contraction—enough, however, to serve our purpose at present.

"*Remedy.*—Preserve a level bearing by making the shoes perfectly flat on the quarters, so as not to interfere with the expansion of the feet. Should contraction already exist to considerable extent, bevel the shoes slightly outward at the heels, in order to facilitate expansion. Care should be used not to bevel too much, or bulging of the lower part of the hoofs at the quarters will be the result. The shoes should in all cases be forged, and not twisted, as is sometimes done to save trouble by the bungling smith. Proper applications, to soften the horny parts and promote elasticity, should also be used. Such preparations are put up in the form of hoof ointments."

164. **Mules.**—Few of the farmers of this country are aware what a debt of gratitude they owe George Washington for the introduction of mules into general use for farm purposes.

Previous to 1783 there were but very few, and those of such an inferior order as to prejudice farmers against them as unfit to compete with horses in work upon the road or farm. Consequently there were no good jacks, and no disposition to increase the stock; but Washington became convinced that the introduction of mules generally among Southern planters would prove to them a great blessing, as they are less liable to disease, and longer lived, and work upon shorter feed, and are much less liable to be injured by careless servants than horses.

As soon as it became known abroad that the illustrious Washington desired to stock his Mount Vernon estate with mules, the King of Spain sent him a jack and two jennies from the royal stables, and Lafayette sent another jack and jennies from the island of Malta.

The first was of a gray color, sixteen hands high, heavily made, and of a sluggish nature. He was named the Royal Gift. The other was called the Knight of Malta; he was about as high, but lighter made, black color, and lithe and fiery, even to ferocity.

The two different sets of animals gave him the most favorable opportunity of making improvements by cross-breeding, the result of which was a favorite jack which he called Compound, because he partook of the best points in both of the original jacks. The General bred his blooded mares to these jacks, even taking those from his family coach for that purpose, and produced such superb mules that the country was all agog to breed some of the same sort, and they soon became quite common. This was the origin of improved mules in the United States; though over seventy years since, there is no doubt there are now some of the third and fourth generations of

Knight of Malta and Royal Gift to be found in Virginia, and the great benefits arising from their introduction to the country are to be seen upon almost every cultivated acre in the Southern States. Notwithstanding the enormous increase of late years, arising from a systematic course of breeding in the Northern States for the Southern market, mules were never more valuable than at present, or more ready of sale at high prices.

165. **Longevity of Mules.**—We have numerous reports of mules attaining the age of forty, fifty, or sixty years, and Col. Middleton, of South Carolina, stated some years ago that he had one at work on his plantation eighty years old; and we have seen an account of a mule in Ireland certified to have been at work since 1707, making him over 150 years old. This is, of course, a very uncommon age, but we are satisfied that, with proper usage, mules would commonly attain to about forty years, being serviceable to the last, and this should be counted as one of their elements of value.

166. **The Largest Mule in the World.**—If the following statement is correctly given, it tells of the largest mule, probably, ever produced. We found it in the *Commercial*, of Cincinnati, in 1860. It says:

"The largest mule ever produced in the world is now in this city. It is a mare mule, *nineteen and a half hands* high, and weighs *eighteen hundred and thirty-two pounds.* This extraordinary animal is the property of Charles Frost, of Wayne County, Ind., recently purchased near Lexington, Ky."

167. **Mules, Horses, Oxen.**—We read in almost every agricultural paper, we hear in most agricultural addresses, and we often hear in conversation, that one or the other of these animals is the one, and the only one, that farmers should use, yet we have never seen a farmer who could say, "I know." One who has always done his farm-work with oxen is sure that they are the best in all respects; while fifty miles away he would search a hundred farms to find as many yoke of oxen, and where he did find them he would probably be told they were only fit for drudgery—that horses only are suitable for farm-work, and their owners are ready with loads of reasons to substantiate their theory. But take another day's journey, and the theory is upset with mules—mules here, there, everywhere; nothing but mules, and nothing fit for a farm but mules, because they are so strong and hardy they never tire, and live upon almost nothing for their daily rations, and are the very personification of life everlasting.

Now, while the advocates of each class of animals disagree so widely, how are the seekers after truth to satisfy themselves? Do they look to us for an opinion? We can give it; here it is. All are best, and upon a large farm all would be found economical to keep for different classes of work; and it is our opinion that no man who farms a hundred acres can afford to do without oxen, mules, and at least one horse. If his oxen are well trained, they will travel as fast before the plow and wagon as mules; but the latter are so much more enduring in hot weather, at all sorts of hard work, that their services are then particularly valuable. They are better, too, to go off upon the road, or to carry produce to market, because they may be, though naturally about as slow as oxen, trained to travel homeward without a load at a round trot. For working singly in the cultivation of crops, mules are far superior to horses, and of course can do a great deal of work that could not be done by oxen. We have seen mules that were fair substitutes for saddle-horses, having one good quality, that of sure-footedness. There is one objection to mules on a farm where the stock is generally pastured: there is nothing short of a Mississippi fence that will hold them—that is, twelve rails high, and stake-and-ridered; and we have heard planters declare that they had often known the brutes to climb over such a fence as that. In advising a Northern farmer to keep mules, we therefore advise him to make his calculation to keep them in a stable all the time they are out of harness.

168. **Breeding of Horses and Mules.**—There are certain universal laws of breeding which can not be ignored, except at the sacrifice of all success. In Kentucky and Tennessee, a very large strain of mules have been obtained by using jacks of immense size. We recollect seeing one at R. Cockrill's, near Nashville, over eighteen hands high. We have seen several mules of that hight, and numerous ones of sixteen and seventeen hands high. It is still a question whether such large mules are as economical as the smaller sizes, which cost less at first and cost less for sustenance; and some persons contend that at ordinary labor the small mule will do as much and last longer.

In breeding either horses or mules, a writer upon the subject says: "If we would have sound stock, we *must have constitutional soundness in both dam and sire.* There are hundreds, ay, thousands, who will scour the country and compare the merits of a dozen horses—will give time and money to secure the services of a good stallion—and all with the expectation of procuring a fine colt from a miserable, puny, ill-shaped, broken-winded, spavined old mare. How often do we hear it said, 'Oh, she will do to raise a colt from;' or—after hard service and cruel usage have left a mere wreck of what, away back in the farmer's memory, was once a beast of power, activity, excellent temper, and noble bearing—'we must now turn the old mare out to breed from.' The start is wrong, the foundation is defective—what wonder should the structure tumble to the earth?

"In the mare we need size and symmetry; if there be blood, all the better—it will tell. Without the first two, however—even though all the blood that has flowed through thorough-breds, from the days of Godolphin to the present, were in her veins—she is utterly unfit for a breeder. Many animals possess some favorable peculiarity which owners wish to transmit, and though there may be a structural deficiency in some other part, the mare is brought to the breeding paddock in the hope that the desirable features will be prominent in the colt, even if it be at the expense of other points of strength and action. The breeder here commits an error. It would be better to let the mare go, for in the very large majority of cases the deficiencies will be transmitted while the excellences will not.

"In choosing a mare for breeding purposes, she should be so formed in frame, as to be capable of carrying and well nourishing her offspring; that is, she should be what is called "roomy." There is a formation of the hips which is particularly unfit for breeding purposes, and yet which is sometimes carefully selected, because it is considered elegant; this is the level and straight hip, in which the tail is set on very high, and the end of the haunch bone is nearly on a level with the projection of the hip bone. Nearly the opposite form is the more desirable, where, on examining the pelvis, it will be seen that the haunch bone forms a considerable angle with the sacrum, and that there is, as a consequence, plenty of room, not only for carrying the foal, but for allowing it to pass into the world. Both of these points are important, the former evidently so, and the latter no less so on consideration; because, if the foal is injured in the birth, either of necessity or from ignorance, it will often fail to recover its powers and will remain permanently injured. The pelvis, then, should be wide and deep—that is to say, large and roomy, and there should also be a little *more* than the average length from hip to the shoulder, so as to give plenty of bed for the foal, as well as a good depth of back ribs, which are necessary to give the strength to support this increased length. Beyond this roomy frame, necessary as the egg-shell of the foal, the mare only requires such a shape and make as is well adapted for the purpose she is intended for—that is to say, for producing colts of the style and form she is intended to produce. We will add, that she must have four good legs under her, and those legs standing on a foundation of good, well-shaped, *large* feet, open heeled, and by no means flat-soled.'

"'In health,' says the same writer, 'the brood mare should be as near perfection as the artificial state of the animal will allow; at all events, it is the most important point of all, and in every case the mare should be very carefully examined with a view to discover what deviations from a natural state have been entailed upon her by her own labors, and what she has inherited from her ancestors. All accidental defects, such as broken knees, dislocated hips, etc., may be passed over; the latter, however, only when the stock from which the mare is descended are famous for standing their work without this frailty of sinew and ligament. Spavins, ring-bones, large splents, side-bones, and, in fact, all bony enlargements, are constitutional defects, and will be almost sure to be perpetuated, more or less, according to the degree in which they exist in the particular case.'

"Having said thus much upon the requisites on the side of the dam, let us see what should be sought for in a sire. It is maintained by all writers upon this subject, that *blood* should be possessed by a stallion in an eminent degree; that the essential on the part of the sire is the greatest amount of pure blood compatible with size, weight, and power according to the purposes for which we intend to breed. Our best veterinarians argue that the degree of strength in the bone, sinew, and frame of a blooded horse is, in proportion to extent, vastly superior to that contained by his coarser and more mammoth brother, the English cart-horse. The difference in the form and texture of the muscular system, and in the lesser tendency to form flabby, useless flesh, is also in favor of blood. In addition to all this, the general constitution of the animal is calculated to furnish him with greater vitality, recuperative energy, and physical power—in proportion to size and weight—and, as a consequence, quicker movement, greater courage, and better powers of endurance.

"Herbert, in his 'Hints to Horse-Keepers,' gives his views upon this branch of our subject so concisely and clearly, that we can not refrain from quoting a paragraph, as follows: 'To breed from a small horse with the hope of getting a large colt; from a long-backed, leggy horse, with the hope of getting a short, compact, powerful one; from a broken-winded, or blind, or flat-footed, or spavined, or ring-boned, or navicular-joint diseased horse, with the hope of getting a sound one; from a vicious horse, a cowardly horse—what is technically called a dunghill—with the hope of getting a kind-tempered and brave one; all or any of these would be the hight of folly. The blood sire (and the blood should always be on the sire's side) should be, for the farmer-breeder's purposes, of medium hight, say 15½ hands high, short-backed, well ribbed up, short in the saddle-place, long below. He should have high withers, broad loins, broad chest, a straight rump, the converse of what is often seen in trotters, and known as the *goose-rump*; a high and muscular, but not beefy crest; a lean, bony, well-set-on head; a clear, bright, smallish, well-placed eye; broad nostrils and small ears. His fore legs should be as long and as muscular as possible above the knee, and his hind legs above the hock; and as lean, short, and bony as possible below those joints. The bones can not by any means be too flat, too clear of excrescences, or *too large*. The sinews should be clear, straight, firm, and hard to the touch. From such a horse, where the breeder can find one, and from a well-chosen mare (she may be a little larger, more bony, more roomy, and in every way coarser than the horse, to the advantage of the stock), sound, healthy, and well-limbed, he may be certain, accidents and contingences set aside, of raising an animal that will be creditable to him as a scientific stock-breeder, and profitable to him in a pecuniary sense."

With these general remarks upon what we require in breeding, we think we may close the section upon horses. We hope what we have given in relation to breeding horses will be carefully studied and breeds compared, and that what we have said will be just sufficient to awaken an interest that will tend to the improvement of this most faithful beast in the service of man. If we have not got the right breed, let us inquire where is the deficiency, and amend it. Above all, let us think what purpose we are breeding for, and not attempt to get an animal suitable for a lady's saddle from an English cart-horse or the Norman diligence.

169. **Horse-Gearing.**—If a New Mexican, or even a full-blood North Carolina mountaineer, should appear in the city of New York with his horse harnessed, as we have have often seen, it would attract much attention, as the whole gearing might not have a particle of leather or iron in its compo-

sition, the collar being made of braided corn-shucks, the hames of natural crooked sticks, the traces of raw hide, fastened to the hames by a hole and a knot, and to the whiffletree by a loop around the end. Rude as this gearing is, it answers a good purpose, and does not gall or sweat the horse like the great English collars, or like those known in our boyhood as the "old Dutch collar," which was so much like the breeching of the same harness that it was rather difficult to tell which belonged forward and which behind.

The old English collar, specimens of which may be seen occasionally in this country, was a most cumbersome piece of horse-gearing which a sensible man will not be likely to copy. It is made like our American collars, only very much heavier, and has attached to its upper end as an ornament two pieces of stiff sole leather as big as the skirts of a saddle, with a great deal of ornamental stitching around its edge. Some of these collars weigh 12 to 15 lbs., and the hames are furnished with two brass horns that stick up several inches above the flap.

The Scotch collars are also made with a great superfluity of leather, and are very heavy, though differing in form from the English collars.

The weight of a Scotch plow harness is given in Stephens' book of "The Farm" at 38 lbs. We have often seen a horse equally well harnessed to a plow in this country when the whole gearing would not weigh half as much, nor cost half as much, as an English collar. These English collars are often ornamented with red worsted fringe and tassels, and give a six-horse team, wearing bells, a very formidable appearance.

We recommend as an improvement upon our own light, easy, and, we think, handsome collars—handsome, because fitting for their purpose—that they should be made open at the bottom. We drove one pair of horses from Chicago to New Orleans, and from New Orleans to New York, making many detours, and in all driving some five thousand miles in one journey, with a pair of collars open at the bottom; and although out in all sorts of weather, never had a sore shoulder or even chafed off the hair. Neither did we use breeching in all that journey, yet we traveled over some very rough and mountainous roads. We are satisfied that a horse will hold back a light carriage with a good strong padded girt as well as with breeching. Our plan of a harness is exactly the contrast of an English one. Theirs is, to use up all the leather and labor possible, and ours to use just as little as possible. We do not believe in blinders, check-reins, breeching, nor heavy collars. The harness should be made as light as it can be and be strong. Strength is an important particular. For a farm-wagon or plow harness we recommend short leather tugs and chains as preferable to long tugs or long chains.

170. **Working Three Horses Abreast.**—In the north part of this country it is not very common to see three horses worked abreast. It is quite common in Louisiana, particularly in working horses to carts. It is much practiced in England, and perhaps would be more so here if farmers had proper gearing. We have seen it practiced sometimes by hitching the middle horse to the center of the swing-bar. This gives no chance of equalizing the draft

between the three horses. The English have what are called compensating bars between the swing-bar (which we call the double-tree), and the three single-trees, so that each horse may be seen to pull equal to the others.

These bars should be made of iron, one and a half inches wide and three eighths of an inch thick. Two of the bars are each 27 inches long, and these are attached, as the single-tree usually is, to the ends of the swing-bar, by a fulcrum just one third of the length from the outer end. Then a center bar, 20 inches long, is attached by working joints to the ends of these outside bars, and the single-tree of the center horse is attached to the center of this bar, and the single-trees of the outside horses are attached to the ends of the other bars. This equalizes the strain upon all the horses, for it is impossible for one to start ahead without imparting motion backward to both of the other horses.

The irons of a single or double-tree should always be made so as to clasp the wood, which should never have a hole bored through it to pull by.

171. **Dimensions of Double and Single-Trees.**—Perhaps every farmer knows how to gear a horse, and what are the proper dimensions of a set of double or single-trees. But there are many persons who take to farming in after-life, and others who may have occasion to make this part of a set of horse-gearing, and these will be glad to have the following directions to refer to.

The bar of a double-tree should be three feet nine inches long and three and a half inches wide at the center, and one and a quarter inches thick, and it should be made of the strongest kind of wood that can be procured, and straight grained and free from knots. The best wood we have for this purpose is second growth white ash, such as all of our best hoe and shovel handles are made of in the United States.

A single-tree should be three feet three inches long, two and a half inches wide, and one and a quarter inches thick. The irons of double and single-trees may be all made of the same form and strength; that is, a piece of the very best flat bar iron, one and three quarter inches wide and one fourth of an inch thick, is bent so as to clasp around the back part, and the ends come about two thirds of the width toward the front edge, with half-inch holes through the end and through the wood. In this hole a piece of half-inch iron is to be inserted by tapering the ends so that they will go through the hole from each way and clinch fast on the flat iron, leaving the bend forward so as to form a loop in which to put the hook of the single-tree, or the chain, or a loose ring, as may be required. These irons can not come off, even if they should get loose, and the wood is not likely to break, because there is no strain upon it. The strain is all upon the irons, and when the loop wears out, a new one is easily inserted in its place. The center irons of the double or single-trees are put on after the same fashion, the loop of the round iron being back, instead of forward, and both the flat and round irons for the center may be a little stronger than the ends.

This plan is far better than making the irons to drive on like a ring, fastening them by a few stub-nails driven in the end of the single-tree. Accidents often occur from the irons of single-trees, put on like rings, getting loose and working off. Such things seem always to happen at the most unpropitious times. We knew one man well, who lost his life in consequence of just such an accident. He was crossing one of the Western prairies upon a cold, stormy night, when the accident occurred, by which he was unable to proceed, and, as was supposed, while getting his horses loose, that he might ride to the nearest house, some miles distant, he became so chilled as to be unable to mount on horseback, and before morning his horses left him alone to perish—all in consequence of having bad gearing.

We have ourselves had some very unpleasant experience in our prairie traveling, arising from broken swing-trees, and therefore warn you to make them very strong—no matter about the looks. Utility is everything.

Plowing with four horses, though not much practiced in this country, is sometimes necessary, and, for want of practice, but few know how to attach four horses to a plow so as to work in the easiest manner.

The common way is to hitch the double-tree of the leading pair to a hook in the center of the double-tree of the rear pair. This gives a dead pull to the leaders without affecting the other pair. To obviate this, and give a compensating balance to both pair, the following plan has been adopted: Attached to the hook of the plow-beam is an iron pulley, about six inches diameter. The chain from the first set of double-trees, instead of being hooked to the plow-beam, is rove through this pulley, and the end carried forward and hooked to the forward double-trees. The working of this is, that neither pair can give a dead pull independent of the other pair. If you touch up the hind pair so that they start suddenly forward, the pull does not give the plow a jerk, because the chain yields around the pulley and soon draws back upon the leaders, giving them a hint to press forward, and thus keep the strain even. To prevent either pair from drawing too much of the chain through the pulley, you can insert an open ring into a link at a suitable distance on either side.

There is no other plan that we have ever seen in operation, so simple as this is, to give a perfect equilibrium and balance the forces of each pair of horses. In fact, the whole four, by the aid of the swing-trees and pulley, are all kept in equilibrium.

It will be well for the hind pair of horses to wear a common wagon neck-yoke, and pass the chain that extends to the double-trees of the forward horses through the ring, or if that is too high, through a loop attached to the ring. The chain is sometimes supported by a strap swinging between the rear horses, each end attached to a back band on to the hames.

PLATE X.

(Page 123.)

This picture speaks for itself, and does credit to the artist. It is one that will interest more persons than any other. The descriptions of these fowls will be found in Section IX., ¶ 180, 181, 182, together with several other kinds. Those here illustrated comprise most of the best improved varieties, and quite as many as any farmer will care to possess. By comparing the descriptions with the pictures, it will enable any one to make a suitable selection. The description of poultry fails to give satisfaction without pictorial aid. It is here complete. We may well feel proud of this picture.

A GROUP OF DOMESTIC FOWLS.

1.1. White Dorkings.
2.2. Poland Fowls.
3.3. Creoles, or Bolton Grays.
4.4.4. Cochin Chinas.
5.5. Gray Game Fowls.
6.6. Hamburg Fowls
7.7. Bantams

SECTION IX.—POULTRY.

Maxims for Poultry Keepers.—Those who expect to be successful in raising or managing poultry, or hope to make it a paying part of farm business, should observe a few simple rules which will save them from much disappointment and trouble.

1. It is not advisable to keep large numbers of hens together, or go into the poultry business on a large scale. It is found impracticable and unprofitable; besides, they can not be kept in so healthy a condition as where but few are together.

2. It is impossible to keep hens to advantage without having a properly arranged house for their accommodation. This is as necessary as that a farmer should have a stable for his cattle or a dwelling for his family.

3. In connection with the house, a poultry-yard should be provided, which should contain a grass-plot, gravel, some quantities of slacked lime, and dry ashes.

4. The inside of the poultry-house should be whitewashed twice a year, or oftener, which will serve to keep it free from vermin, and the hens will be kept in better condition.

5. Pure water, in sufficient quantities, must be provided several times a day, in winter and in summer.

6. Feed should be given at regular periods. To fatten fowls, they must not be allowed to run at large.

These rules are subject to variation under certain circumstances. A new settler in the woods would not consider them applicable. It would be more profitable to let his poultry run at large. So it is upon all farms at some seasons, but there are but few farmers who would not sometimes find it profitable to shut up all his poultry, the gallinaceous portion of it particularly. For this purpose a poultry-yard will be found always a great convenience, if not a great profit. It should be so constructed that its first cost will not be money unprofitably spent. Many persons have found it profitable to have a tolerably large inclosure for poultry, and plant that with plum-trees. It is asserted that curculio insects never disturb plums upon such trees. It is our opinion that it would be found very profitable to have a portable poultry house and yard, which could be conveniently moved from place to place, keeping it upon one spot one year, and upon another the next. By this means some bad brier-patches would be subdued, and some poor spots cheaply enriched.

If poultry are kept in a yard, the ground should be often dug up. If the yard is large enough, it may be plowed. It is a good way to have a large yard in two parts, and plow and sow grain in one, and when it gets large enough for the hens to eat, turn them in and plow and sow the other.

Hens that run at large are often very troublesome, sometimes doing "more mischief than their necks are worth." The following device is for such mischievous pests.

173. **Shoeing Hens.**—"We observe a recent notice, in some paper, of the practice of making woolen shoes (or rather boots), to prevent hens from scratching. A flock of fifty fowls, like our own, would require considerable labor in the manufacture of a hundred woolen boots, which might be worn through in a short time and need renewing. It is much better, we think, to procure a breed that will not scratch. There is another point of importance—that is, to keep the animals well fed during the season when scratching is most feared."

One man says: "I keep from thirty to fifty of the white Shanghae—a very quiet, well-behaved, and profitable fowl—and adopt the most economical mode, namely, regular feeding with grain; and although there is no barrier between their ordinary range and the kitchen garden, they do not scratch yearly enough to do twenty-five cents' damage."

174. **Number of Hens to Keep, and Time to Sell.**—A correspondent of the *Illinois Prairie Farmer* says: "We have kept as many as 150 fowls, and fed them three pecks of shelled corn daily. But our experience has been, that we could get more than half as many eggs from twenty-five fowls as we could from one hundred. We have carried chicks the size of quails to market and found them ready sale at twenty-five cents each. We might have kept them four months longer, and found them dull sale at a dime apiece."

175. **Feeding Hens Meat.**—We have been advised to feed plenty of meat to our hens, if we wanted them to lay steadily. Now there is a time to feed meat and a time not to feed it. When the temperature is low and the ground is frozen, feed meat, but when the weather is warm, or even moderate, if the chickens can scratch the ground and find worms and insects, they need no meat. The insects and worms furnish meat sufficient, and too much in many cases, causing them to lay eggs without any shell. They should then have plenty of lime or old mortar, gravel, etc.

Young chickens generally do best in coops, raised some inches from the ground, until they are six or eight weeks old; if they droop after this, the next hour of warm sunshine will bring them up again. A correspondent says, the last time he tried to raise them on the ground, he lost 59 out of 60. He has often raised 60 or 70 at a time since without losing one, simply by cooping them away from the ground until six weeks old.

A writer in the *English Agricultural Gazette* recommends that a piece of iron be kept constantly in the water to which fowls have access. Iron rust, he says, is an excellent tonic. A roll of brimstone is also recommended to be kept in the water.

176. **How to Keep Hens Shut up.**—It is one of the most important matters

about poultry keeping, particularly to small farmers and villagers, to know how to keep hens in confinement. It is very convenient for many persons who could not allow them to run at large to annoy themselves and neighbors, to keep enough to supply the family with fresh eggs, and perhaps a few chickens.

As confinement is an unnatural condition for fowls, it is often an unhealthy condition. The question is, can they be kept shut up in close quarters and keep healthy? If large numbers are together, they are very apt to get a disease which makes them lose their feathers. Sometimes they pull them off of one another. Great attention should be paid to cleanliness, where fowls are shut up. Lime for the hens to eat—lime scattered over the floor—lime used as whitewash, should never be neglected. The following rules are very good:

1st. Do not keep more than ten hens confined in one small yard. They will be more profitable than fifty. If you wish to keep a large number, have several places for them.

2d. Do not confine them in a damp or shaded place, but in a dry one, where they can have both shade and sunshine. The latter is very important.

3d. As they can not remove from the filth that accumulates, it should be removed from them. There is no permanent success in keeping fowls in confinement without the utmost neatness. Their droppings should be daily removed from the roosting-place, and the yard should be well littered with fresh straw, tan, or other material, as often as is necessary.

4th. The hen is omnivorous—that is, she eats almost everything; insects, flesh, grain, and fruit are taken with avidity. All attempts, therefore, to confine hens to a single article of diet will fail. Give them a good supply of grain and butchers' scraps, boiled potatoes, sour milk, and the refuse of the kitchen, and during the summer months an occasional taste of fruit, and, in addition, egg-shells and oyster-shells crushed; or, if you can not get these, pound up the bones that always collect about yards. It is wonderful with what avidity fowls, especially when confined, will eat broken bones.

5th. *Plenty of clean* water is always necessary. Stagnant or filthy water will not do. It alone is sufficient to cause disease. Running water is best, but clean, fresh water will answer.

6th. Exercise is quite an important part of the plan. Turn them out an hour before sunset to pick up insects, gravel, and other substances, and it will quicken their circulation and add much to their powers of resisting disease. We have heard a poultry keeper say, who followed these rules, that with him the balance-sheet gave a large profit.

Although the above remarks are applicable principally to residents of towns or villages, yet we would like to add a word for the benefit of farmers. How few of them keep poultry at a profit! Indeed, as generally kept about the farm, with free range of the barn, grain, and often portions of the house, they are of no profit, and very often are an almost intolerable nuisance.

177. **The Food of Fowls.**—This is a very important question. A great

many expedients have been resorted to in order to cheapen the food of fowls. Chandlers' greaves are largely used by parties in the vicinity of New York to fatten poultry for market. These are good for an occasional feeding, but for exclusive food we have our doubts, and think others will, after reading the following extract:

178. **Are Fowls Wholesome which are Fed on Putrid Meat?**—Such is the question considered by Dr. Duchesne in the January number of the *Annales d'Hygiène Publique.*

It is well known that man can not indulge in putrid meat with impunity, and numerous cases are on record where accidents have occurred from this kind of food. Little is known, however, of the effects produced by the flesh of animals otherwise in good health, but nourished with flesh in a state of putrefaction. Certain animals can undoubtedly be nourished on such putrid matters; but it is important, in a hygienic point of view, to determine the modifications which the exclusive use of putrid viands may produce in the quality and the preservability of fowls destined for the market.

On the occasion of a complaint against a farmer in the neighborhood of Paris, Dr. Duchesne visited his establishment on a warm day in July, and toward the afternoon. The food of the poultry he found to consist of flesh in a state of putrid decomposition, which had been obtained from the slaughter-houses of Paris. The fat is first removed by cooking, and bran is added; and this mixture is given morning and evening to the fowls, who fight for it with avidity. A very fetid odor came from the barrels in which the food was contained, from the vessels where it was supplied to the fowls, and also from the ground round about them. The fowls, however, appeared to be in perfect health. Dr. Duchesne supplied himself with three eggs laid that day, and also with a fowl and duck of a year old, which were killed before him. In three hours' time the poultry gave out a very strong odor, and the intestines were so offensive that they had to be removed to a distance. Decomposition rapidly set in. The fowl, at the end of twenty hours after being cooked, had an unpleasant, strong taste, and the duck, at the end of twenty-four hours, was in such a state that it could not be eaten. Next day, when the flesh was cold, and the smell abated, portions of the duck were partaken of by the servants. The eggs, too, were found, if kept a reasonable time, to become very unpalatable. In fine, it was shown that though fowls nourished in this way were apparently healthy, and could be eaten at a pinch without great inconvenience, yet that it was most probable that the continued use of such articles of diet would be attended with danger. The Council of Health at once interdicted the sale of fowls fed in this objectionable manner.

Dr. Duchesne continued his inquiries at the great knackery of Aubervilliers, where pigs and fowls are fed in great numbers on flesh, raw and cooked, and where similar animals are reared on a mixed food, consisting of flesh and grain. The results of his observations are embodied in the following conclusions:

1. Fowls and pigs may be fed on sound flesh, raw and cooked; on flesh, raw and cooked, of animals affected with contagious diseases, as glanders, malignant pustule, hydrophobia, etc.; and even on flesh, raw or cooked, in a very advanced state of putrefaction, without any alteration in their health.

2. Chickens are reared with difficulty if their food be restricted to flesh, raw or cooked, even when sound; and a larger number of them perish than when fed on ordinary kinds of food.

3. The eggs of fowls thus nourished are as palatable as the eggs of fowls nourished in the common way. The shell, however, is thinner and more easily broken.

4. The flesh of fowls and pigs nourished on flesh raw or cooked, is softer, more difficult to preserve, and the fat is yellow and more diffluent.

5. The doctor has still doubts as to the absolute wholesomeness of fowls and pigs fed on animals dying of glanders, etc., and recommends that the use of the flesh of such animals should be prohibited for the rearing of fowls and pigs.

6. The use of flesh in a state of putrefaction, for similar purposes, should be absolutely prohibited as unwholesome.

7. Fowls should not be fed too long or too abundantly on worms, caterpillars, beetles, etc., as such food communicates a strong taste to the flesh.

8. The continued use of flesh, otherwise healthy, and either raw or cooked, ultimately injures the growth of the fowls and the quality of their flesh.

9. The best method of rearing undoubtedly is, to give flesh but once a day, and to finish with a meal of grain.

10. For market use, the use of flesh should be stopped, and the fowls restricted for some time to the use of a vegetable diet.

179. **Choice of a Cock.**—In breeding, the choice of a cock is a very important matter. The following are some of the "points" insisted upon by poultry fanciers:

It is accounted that he has every requisite quality, when he is of good size, carries his head high, has a quick and animated look, a strong, shrill voice, the bill thick and short, the comb a fine red, and in a manner varnished; a membraneous wattle of a large size, and colored the same as the comb, the breast broad, the wings strong, the thighs very muscular, the legs thick, the claws with nails rather bent, and with a very keen point; when he is free in his motions, crows often, and scratches the earth with vigor and is constantly in search of worms—not so much for himself as his mates—when he is spirited, ardent, and clever in caressing them, quick in defending them, attentive in soliciting them to eat, in keeping them together in the day, and assembling them at night.

There are some cocks, which, by being too high mettled, are snappish and quarrelsome. The way to quiet the turbulent ones is plain: their foot must be put through a leather, in a round shape; they become as quiet as men who are fettered at their hands, feet, and neck.

180. **The Varieties of Common Fowls.**—As to the variety to be chosen, that

must be left to the fancy of those who are to raise the fowls. In a farmer's family, this will generally be the female portion of it, and the gudewife or children who take the fowls under their charge, should be consulted. At least the different varieties should be made known to them, by placing in their hands some good treatise upon poultry. Several volumes have been published, with portraits and full descriptions, and how to conduct the business of poultry raising on a large or small scale. We can not give this information in full; we will only name the several sorts which are to be found among poultry fanciers in this country, with short descriptions, and refer readers, for comparison of size and form, to the beautiful engraved illustrations of varieties, found in standard English works on Domestic Poultry.

181. **The Shanghae and China Breed.**—A few years ago a good many people in this country, afflicted with the "hen fever," went into ecstasies over the Shanghae, or China, breed of fowls, some of which are enormously large. Cocks are spoken of as being twenty-eight inches high. The wings are short, and placed high upon the body. The tail is short, with a thick clump of feathers over the root of the tail feathers. The cocks have large combs and wattles; the hens are seldom large. The legs are feathered. The eggs are not large in proportion over the size of eggs of our old-style fowls; the color is nankeen, and the ends rather blunt.

Those who breed Shanghae fowls consider the flesh very good, and the full-grown bodies of cocks weigh eight or ten pounds, and pullets six or eight pounds. There are varieties of colors among the Shanghaes—some being pure white; others, a reddish brown, etc.

The variety known as Cochin-China fowls differ very much in quality, habits, and general appearance from the Shanghaes, to which they are closely related. Their eggs are nearly the same shape, size, and color. The main difference is in the somewhat deeper and fuller breast, and being generally smooth-legged. They also have the same hollow, harsh voice, when crowing, in their peculiar sonorous tone, long drawn out, and very unlike the shrill ringing clarion of our old-style barn-door cock.

The Malay, or Chittagong, is another name of one of the varieties of the China breed of fowls, which are supposed to be larger than the Cochins; the size, by weight, accorded to some of them seems enormous.

We believe the variety called Malay fowls are considered identical with the variety called Chittagong. The full-grown Malay cock is said to weigh 12 lbs., and the hens 8 to 10 lbs. They are of all shades of color, and have small, thick combs and small wattles, and no top-knot; the legs not feathered. Their eggs are larger than those of the other large varieties. The crow of the Malay cock is loud and harsh, but terminates abruptly.

182. **Ornamental Varieties of Fowls.**—As the China breed, which we have described, can not be said to be ornamental around a genteel farm-house or rural residence, we will name some which are so, and at the same time are, at least some of them, very valuable for all domestic purposes. The general appearance of the various sorts may be judged from reading the short notes

which we append. The most ornamental thing about a yard full of fowls is to have them all of one variety; for instance, Dominiques, all looking so much alike that individuals would be hardly distinguishable.

The *Pheasant-Malay* is the name given to a variety of imported fowls, which are esteemed by some as quite desirable, particularly as ornamental stock. They are called good layers, good sitters, and good mothers. The cocks have black tails, and black on the neck and wings. Full-sized eggs weigh two ounces each. The newly hatched chicks are yellow, with a black mark down the back. Some of the hens are described as of a pheasant color, with long velvety black necks.

Guelderland fowls is the name of another variety; they are jet black in the plumage, without combs, and small wattles; bodies short and plump; legs long and feathered; eggs large, white, oval-shaped, and rich. The hens are not esteemed good layers nor sitters. This variety comes from the north of Holland.

The Dorkings.—This, in our opinion, is one of, if not the, best varieties we have in this country for the every-day purposes of farmers. It is the sort mostly used for caponizing in England. There are white, gray, and brown Dorkings. The legs are white or flesh-colored, smooth, and terminate in *five* toes. They feed well, to a good size, and the flesh is considered particularly delicate. The cock's comb is large and erect, and deep serrated, free from top-knot; wattles, large. They are noted for hardiness; are prolific, and chickens easily raised. The eggs are large, pure white, very round, and nearly equal in size at the ends. The chicks are brownish yellow, with a broad stripe down the middle of the back, and a narrower one on each side; feet and legs yellow.

Black Spanish is the name of a variety of very ornamental as well as useful fowls. The plumage is glossy black; the combs of both cocks and hens large and red; and their general appearance spirited and handsome. They have a singular mark, which distinguishes the variety—it is a white mark on each cheek, not of feathers, but a fleshy substance, which in the cocks is very conspicuous. The hens are great layers, but not inclined to sit. The eggs are large and white, and so is their skin and flesh, which is tender and juicy. The chicks are black, with a white spot on the breast, and are long in getting feathered; so none but early spring chickens should be attempted, and these must be obtained by setting hens of another variety upon the Spanish eggs.

Game Fowls.—There are several distinctly marked sorts of game fowls—black, white, gray, and brown, all having the same general characteristics, the most marked of which is pugnaciousness. The general size is $3\frac{1}{2}$ to $5\frac{1}{2}$ lbs. The eggs are smaller than the eggs of the most common fowls, uniformly shaped, and cook rich and delicate. In form the game fowl is the handsomest of the race. The head is thin and long; eyes large and full; beak stout and crooked; long neck; body compact, short, and round in the breast; thighs thick, stout, handsome, taper-shaped; legs long and thick and colored like the beak; feet thin, broad, strong, with very long claws. The cock walks with a proud, defiant courage, and appears always ready for a fight. It is a good variety to breed from for domestic purposes, if care is taken not to allow cocks of any other sort upon the premises, and not to allow cocks ever to be pitted against each other.

The Mexicans appear to have a variety of game fowls quite distinct from the English varieties. It was first introduced into the United States in 1844, by General Waddy Thompson, of South Carolina. The cocks and hens have but few marks to distinguish one from the other. The original stock are pheasant-colored, and in some of those bred in South Carolina, black tail feathers, and a tendency to gray or light yellow plumage. This variety are great fighters; they have strong, muscular frames, and are quick and firm in action. The cocks have large lustrous eyes and strong bills and upright combs. The hens are good layers and sitters, and good nurses. This is the breed of game-cocks patronized by General Santa Anna, who was the greatest cock-fighter in Mexico.

The *Java fowl* is a very large variety, of black color, said to be found, though probably not pure, on Long Island, and around Philadelphia. They are sometimes called Saddle-backs, on account of being so broad across the rump.

The *Jersey Blue* is the name of a variety quite common in New Jersey, the excellence of which is so great, that anything particularly good is figuratively spoken of as "one of the old blue hen's chickens." The color is light blue, sometimes approaching a dun; legs generally dark, and sometimes lightly feathered. Cocks weigh 7 to 9 lbs.; and hens, 6 to 8 lbs.

The *Poland fowls* take their name, not from Poland, but from a resemblance to the tuft of white feathers worn by Polish soldiers. They are glossy black, except the top-knot, which resembles a full, white rose. Like the Black Spanish, the Polands are great layers and bad sitters. The skin and flesh are white, and good for the table. The cocks weigh 4 to 4¼ lbs., and hens, 3 to 3½ lbs. Their form is plump, and legs not very long, being well-proportioned and handsome-shaped, and they are particularly ornamental to a country seat. The eggs are of good size, and white, but though abundant, are not as rich as some others.

Another variety of the so-called Poland fowls are white, with black top-knots; and another sort are gold-spangled. These are exceedingly ornamental; the crest being large, golden, and brown; legs, light blue, and toes partially webbed.

The *Silver Polands* are spangled with silver instead of gold, and the hens are the most ornamental. Even the chicks of this variety are pretty.

The Poland variety of fowls are only fit for neat places, where they can run upon grassy yards or lawns. In dirty pens the crest becomes loaded with dirt, and blinds the poor birds. Where they can run at large around the house, even if the hens were not, as they are, such good layers, they might well be kept for ornament alone.

The *Spangled Hamburg fowls* are another ornamental variety, with top-knots and beautiful plumage, both gold and silver spangled. The weight of male birds is about $4\frac{1}{2}$ or 5 lbs., and the hens, 3 or $3\frac{1}{2}$ lbs. The cock stands twenty inches high, and hen eighteen inches.

The *Bolton Gray* is another ornamental variety, and also a very useful one, the hens being excellent layers. They are said to have come from Holland to Bolton, England. The color is remarkable; the ground work pure white, delicately penciled with black over the body. The neck is white, and heads surmounted with large, red, serrated combs. The weight of cocks may be 4 to $4\frac{1}{2}$ lbs., and hens, 3 to $3\frac{1}{2}$ lbs. They belong to the small-sized varieties, but are the most perfect patterns of neatness and symmetrical beauty of the domestic fowl family. The chicks are white, except a dark streak on the head and back of the neck, which seems curious, as, when grown, the necks are white and bodies marked with black. The chicks are rather hard to raise. The eggs are small, tapering at one end, and pure white.

The *Silky fowls* are also classed among the ornamental, and comprise several varieties, originating in India. Some have white plumage, with dark skin and bones. The combs of some are black, with black plumage and black bones; and the feathers are so unlike feathers, the hens get the name of silky. They are not considered a valuable bird.

The *Frizzled fowls* is another variety, but not one that we can recommend any one to cultivate. This sort may be known by the description given to us when we first saw any of the kind in our boyhood, and asked the reason of their singular appearance, and were told that the chickens got turned in the shell in an earthquake, which upset things generally and turned the chickens' feathers wrong end foremost. That is the appearance of the pure breed. Every feather looks as though it had been curled and turned wrong end foremost with a pair of such curling-tongs as the girls used to frizzle their hair with in olden time. To our mind, the Frizzles are ugly beasts, not worth raising on account of any good qualities, and only to be indulged in by those who can afford to keep curiosities.

The *Cuckoo fowl* is a variety found in some English farm-yards, and perhaps in this country. It has a barred plumage, somewhat resembling the breast of a cuckoo. The general color is a slate blue, tinged with white; the comb is small; the iris of the eyes, bright orange; feet and legs, light flesh color; so that it will be seen that the breed is rather an ornamental one. The birds grow to a large size; the eggs are very white, smooth, and about two ounces weight.

The *Blue Dun fowls* originated in Dorsetshire, England, and are rather an ornamental variety, under size, slender made, with high, deeply serrated, single combs. Sometimes the Blue Dun cock is gold or scarlet spangled, and very pretty. The hens are good layers, and make good pets. The cocks are rather gamy. The hens are good mothers, and the chicks are real little curiosities. This variety is esteemed for the table.

The *Large-Crested fowl* is another old English ornamental variety, the crest being larger than the Polands, and the fowls of various colors, some of them very brilliant white—more dazzling than the white Guinea fowl, which gives them and the homestead where they are kept a very lively appearance. When dressed for market, their appearance is very clean and attractive. Their general good qualities make them favorites upon many a farm in England.

The *Bantams* are also rated among the ornamental fowls. Some of them are really so. The Sebrights have beautiful plumage of a delicate speckled dark and golden color. There are also black, white, and nankeen colored bantams. Their model is perfect and plumage beautiful, and of only about a pound average weight for the hens, and one and a quarter to one and a half pounds for cocks. They are great pets with many persons in England, and are held at fabulous prices. The bantams are good layers, and good sitters, and good mothers. Some of the cocks are very gamy. We decidedly approve of keeping bantams as ornaments of the farm-yard. And we recommend that the feather-legged variety be avoided, as they are not so neat in muddy weather in their appearance as the naked-legged sort. The color is a mere matter of taste.

The *Dominique fowl* is not only an ornamental variety, but a very good one for every-day purposes on the farm. The true color is a peculiar arrangement of white and blue, that gives a sort of greenish tint to the plumage. The combs are double ; the wattles small ; the legs white or yellow. The Dominiques are hardy ; above medium size ; very domestic ; and the hens are good layers, and most excellent sitters and mothers ; the eggs good size and quality, and the birds excellent for the table.

There are many other sorts of ornamental fowls not entirely worthy of recommendation for domestication in this country—among which is the Bankiva cock, from the East Indies, of the bantam order, but twice as large as the common bantams.

The *Forked-Tail* cock is another India variety, something like the Bankiva cock. This is a wild sort in Java.

Sonerat's wild cock is also an Indian variety, which has been attempted to be domesticated on account of its beautiful plumage, which is a deep gray, tinged with lighter gray on the edges, with deep green tails ; beak, legs, and feet yellow.

183. **Chicken Coops.**—"Anybody knows how to make a chicken coop." No he don't. Not one farmer in ten can make a decent chicken coop. Consequently, old barrels and boxes are substituted. They may be "good enough ;" they are not ornamental, and for ornamental poultry you should have ornamental coops. To make a convenient, light coop, take half or three-eighth-inch boards, six inches wide, and nail them upon posts exactly like siding on a house, if that is the way your house and farm buildings are sided, so as to have a uniformity. If buildings are boarded up and down with battens, make coops in the same way. Board three sides close, and the other side fix

with slats two inches wide and two inches apart, with extra slats that can be shoved in between, being held in place by a bar in front at top, and one at bottom. One of the other slats should also be made movable, so it can be raised to allow the hen to go in and out. If the coop is double, which we prefer, make a movable slat for each room. The dimensions of a double coop may be two feet long, one and a half feet wide, one and a half feet high on the back, and two feet in front, with a close partition in the middle. Make the roof of five pieces of boards—one at each end and one in the middle, nailed fast, and two others hinged and buttoned down on the others, so as to make openings about six inches wide into the coops. One room is for the nest and one for the brood. If two hens are very docile, they may occupy one coop. Outside of the front slats nail a little trough, one foot long, to serve both rooms for water, which will be comeatable outside and in. These are the dimensions of a coop of the smallest size, which will be so light that a child can move it from place to place. It should have a floor; and if rats are troublesome, it can be set up from the ground, particularly at night. The dimensions in length may be increased as much as desired. Set it face to the sun, and in case of storm, or in cold nights, close all the slats, leaving open a hole in each end, high up, about two inches square or round, for ventilation. If you wish to raise your chickens without a mother, line one room of the coop with old carpet, and put a board, covered with woolly sheep-skin, about six or eight inches square, in one corner, just high enough for the chicks to creep under, and look well to them for a few days, and they will do better than with a bad mother. As they grow large enough to go out of doors, let them in a small yard, in front of the coop, to scratch and bask in the sun. The best fence for such a yard is wove-wire, one and a half or two feet high. With nice, warm, dry coops, early chickens can be raised almost as sure as late ones, and where grown for sale, will generally sell for as much when half grown as late ones will full grown.

Stoves in Chicken-Houses.—It has been found profitable, in raising early chickens, to use artificial warmth. A small, warm room, warmed in cold weather by a stove, so as to keep the temperature at about 55 degrees, will allow you to set your hens in January or February, and get chickens which will sell, when the size of quails (say 75 cents a pair), for as much as old fowls. These warm-house chickens must not be allowed to run out in the cold or wet grass, but will be benefited by allowing them to run out in the sun. If we made a business of raising poultry for market, we would set hens in a stove-room all winter. A tun of coal, costing say six dollars, would warm a room all winter, large enough to raise two or three hundred chickens, which would sell in the city markets, certainly at twenty-five cents apiece, when the size of quails.

184. **Set Hens Early.**—It is a great object to set hens as early as possible in spring, as early chickens will begin to lay in October, and give eggs in November and December. Be careful to give your early sitters a warm, dry nest. After the hen has been sitting ten days, examine the eggs to see

if all are good, and throw out the bad ones. To tell which are good, hold an egg up to a hole or crevice of a dark room, and look at it, and if all below the vacuum in the butt is dark-colored opaque, it is in a fair way to hatch. If it is light-colored and yellowish, so that the sunlight can be seen through it, you may throw it out at once; and if all are so, you can dismiss the old hen with your thanks for her good intentions.

"Double eggs" rarely hatch, and when they do, are just as likely to produce two distinct chickens as a Siamese one.

Nests should be made shallow. If boxes are used, not over five inches deep.

185. **Periods of Incubation.**—A common fowl hen sits 20 days; a Guinea fowl hen, 25½ days; a duck, 26 days; a turkey hen, 27 days; a goose, 29 days; a musk duck, 32 or 33 days; a pea-hen, 27 to 29 days.

To hatch healthy chicks in these periods, the birds must have good warm nests in a sheltered situation. Chickens have been hatched in nineteen days, and the period has been prolonged to twenty-seven days.

186. **Weights of Various Breeds of Fowls and other Poultry:**

	Lbs.	Oz.
Black Polish cock, three years old	5	3
" hen, " " "	3	4
" pullet	2	6
Golden Polish cock	5	0
" hen	3	8
Another hen	3	10
Golden Polish pullet	2	8
Malay hen	3	12
Creole (Silver Hamburgh) hen	3	1
Black Nondescript hen	4	10
Globe-crested Polish hen	3	9
Silver Polish hen	3	4
Game-cock	4	10
" hen	3	0
Young Blue Dun cock	3	6
Blue Dun hen	3	0
Large Dun Hybrid hen	3	8
Pheasant-Malay cocks, two years old, average each	7	0
" cockerel, five months old	7	0
" hen	5	1
" pullet, seventeen months old	5	3
" (crossed with Dorking hen), four years old	5	8
Speckled Surrey hen, two years old	5	12
Spanish hen	5	0
Two Dorking cocks, each	7	0
" hens	6	8
" "	6	12
Cock turkey, two years and a half old	17	12
Hen " one year and a half old	10	0
" "	9	9
Turkey cock, sixteen months old	16	0
" hen, three or four years old	8	6
Musk drake (molting)	9	12
White China gander, six years old	12	13
White China goose	11	13
Common China goose, Cynöides, six years old	10	10
Cochin-China cock, about sixteen months old, molting	6	5
Cochin-China hen, " " "	4	6
Malay cock, about sixteen months old	6	14
" hen, " " " "	4	8
Pheasant-Malay cock	5	7
" " hen, molting	3	8
Game-cockerel, about five months old	4	2
Golden Hamburgh cockerel, just arrived from a long journey, about five months old	3	8
" pullet, " " "	2	4
Cochin-China cockerel, six months old	4	14
Another, " " "	4	13½
Silver Hamburgh cockerel, after traveling, about five months old	3	1
" pullet, " " " "	2	8
Black Polish hen, molting	3	0
Golden Hamburgh, "	2	3
Andalusian cockerel, four months old	3	8
" pullet, " " "	2	6½
Black Spanish cockerel " "	2	11
" pullet, " " "	2	11
Silver Polish cockerel, four months and a half old	2	14½
Golden Poland pullet, about five months old	2	8
White-crested Golden Poland pullet, "	2	3

187. **Capons and Poulardes.**—These are terms applied to emasculated cocks and pullets. Every person who makes a business of poultry raising to supply a city market, should learn the art of making capons and poulardes, because they will always sell for nearly twice as much as other fowls.

The instruments used to perform the operation are few and simple, and inexpensive, and the art easily learned.

A set of first-class caponizing instruments is included in the following list: a scalpel, 62½ cents; silver retractor, $1 50; spring forceps, 87½ cents; spoon, with hook, 75 cents; double silver canula, $1 75; total, $5 50.

A much cheaper set of instruments would answer all practical purposes.

The proper age for caponizing chickens is from one to three months. The cock is confined upon a table by weights upon the wings and legs, with the right side up; the feathers are then plucked off a spot on the right side near the hip joint, about an inch across, where the incision is to be made, by which the parts are exposed that are to be removed. The operation takes but a few minutes for a skillful operator.

188. **Pea-Fowls.**—Of all the ornamental poultry ever kept on a place, the pea-fowls take the lead, and well they might, for they are the most useless, and a very expensive luxury. They will not bear confinement; will not even roost in a house, but occupy the tops of the highest buildings or tall trees. And for mischief, from which they can not be restrained, they excel all the feathered tribe. They are cunning beyond belief. They will watch opportunities to visit the garden and steal fruit, and be out before they are suspected. Driving them out with all possible marks of ill-treatment has no effect upon them, as it does upon other poultry. The pea-fowls will bear a repetition of abuse every day, and every day return to their thieving. So no one who has a garden and lawn in one inclosure should attempt to keep pea-fowl; nor where there is any chance for them to get into mischief.

A gardenless mansion may, and should have numbers of pea-fowls. A single pair makes but little show, while a flock makes a most dazzling, splendid appearance. Peahens are two or three years in coming to maturity. They then lay four to seven eggs, which require twenty-seven to twenty-nine days' incubation. Peahens always steal their nests, and their eggs must never be touched, if you wish the hen to incubate them. They may be taken and incubated under a common fowl, or, better, under a turkey, and then the peahen may find another sly place and lay again. The peacock has the reputation of being a bad father, and killing his own progeny. Therefore the hen hides from him as well as from men.

189. **Turkeys.**—Every farmer can and should keep turkeys, and as there are several varieties, he should get the best and keep no other.

Turkeys are less mischievous than most other poultry, and in some cases they are of great assistance to the farmer in destroying insects. The tobacco planters keep turkeys purposely to assist them in ridding the plants of the destructive worms.

The turkey is a much more recent introduction to the poultry-yard than the other varieties. It is said that the black sort was carried from its native wilds of America to England, and that the American stock has been all drawn from the woods, and that the different sorts have come from a Southern and Northern race. We think, though, that it has come from mixing the black wild variety with a white or party-colored one imported from the other side of the Atlantic. We prefer the pure black breed, for it gives us the largest and hardiest birds, and we think, also, the handsomest. The pure white turkey, it is true, is quite ornamental, but it is not as hardy a sort as the black. As for yellow or party-colored turkeys, we would not have them on a place a moment longer than necessary to fatten, kill, and eat them.

The wild hen turkey is wild in the extreme, while the tame one is so domestic that you may rob her secret nest every day of the new-laid egg, yet she will return again and again until she has finished her season, and then commence her period of incubation upon the empty nest. Now, if you have a nest prepared under cover, with the eggs in it, you may bring home the hen and put her gently upon her eggs, and she will manifest great satisfaction, and after carefully examining and placing them all right, will sit upon them as though the nest was all her own. Thirteen eggs are enough for an ordinary-sized turkey, and if she has a good nest she will cover that number, so as to give all a fair chance to hatch. It is not necessary to turn the eggs, as some persons do—the hen attends to that—nor look at them until about the time the four weeks are up, when it will be well to remove the chicks as they come out, or else take out all the shells and rotten eggs, if there are any, to give the chicks room, for they generally are better off in a good nest than out of it. Shut the hen in a coop, where the chicks can bask in the sun, and not get in the wet grass. You need not feed much the first day; a few bread crumbs will answer. Then give all they will eat of hard-boiled egg, chopped fine; chopped meat, fat and lean; curds, boiled rice or hominy, with cress, lettuce, and green onions. Don't stuff them with peppercorns. The idea that that is necessary is all stuff. Liver, boiled and chopped up, is good food; so is barley meal and suet. Melt the suet and pour over the meal and mix, and then crumb up when cold. Many green things may be chopped up and mixed with milk and water and meal. Don't try to cut up feed very fine. The young turkeys, you will find, can swallow big lumps. After ten days you may let the hen run, if the weather is fine. In bad weather they are apt to take cold, and cramp, and die. Care and high feeding are all that are needed to raise turkeys.

We knew a woman in Louisiana who raised fifteen hundred out of sixteen hundred hatched. She had an old negro woman and a boy to attend to the wants of the turkeys, and in wet, chilly weather the young broods were all gathered into a log-cabin, warmed by a generous wood fire.

We have also before us another example of successful turkey raising by a woman, that is worthy of attention by some other farmers' wives, who may go and do likewise. Lydia Eldridge, of Andover, Mass., writes her experience in raising turkeys, under date of Dec. 25, 1858:

"Last spring my husband purchased a farm in this town, and I obtained one turkey, and she laid 24 eggs, hatched them all out at one litter, and I raised them all. Yesterday we dressed the last of them. The united weight of the whole, when dressed, was 212½ lbs.; 198 lbs. were sold for a shilling a pound, New England currency, amounting in the aggregate to $33. The whole number at that price would have amounted to $35 41. Now I think that is doing quite well, and if anybody among your army of readers can do better than that, I think they deserve a premium; but until that is done, I think I can claim the palm."

And, in our opinion, she is fairly entitled to it. We hope, however, that some other woman will try to win it from her by fair competition in this appropriate field of woman's labor.

And here is another of the same sort, which should tend to encourage other women to attempt the same plan to make a little "pin [feather] money." It is to encourage others that we collect and publish these facts.

"J. E. Alton, of Quinsigamond, Mass., writes us that Mrs. M. Bennett, of Auburn, Mass., had a three-fourths wild turkey, of very large size, which laid 11 eggs, all of which she hatched and raised. At six months old the united weight of the eleven was 220 lbs. Some of the male birds weighed 34 lbs., and the lightest hens 17 lbs. One male sold for $7, and the whole for $55."

These, however, are fancy prices; but at the steady market prices of dressed turkeys, which will average 10 cents a pound wholesale, in New York, and considerably more for choice birds, the raising and fatting of turkeys is a profitable branch of farming.

It is true that young turkeys, from the time they are old enough to turn out to range for themselves, are voracious eaters, and would destroy some crops, and so would swine, if permitted to run at large. The farmer finds it profitable to keep a lot for swine, and so would he to devote a whole field to turkeys; and if he will do that, where they can forage for themselves, they will need very little attention, and will not be likely to get into much mischief. If rightly managed, a flock of turkeys will do more good than harm on a farm, for they are great destroyers of insects. It will be found profitable to plant cabbages, turnips, bagas, peas, oats, wheat, and clover purposely for the turkeys to feed upon. This can be managed on a small scale to advantage by using a movable fence. We have no doubt about the fact that a turkey farm would be as profitable as a sheep farm, or a milk farm, or a beef or pork-making farm. In all new sections of country, where mast is abundant, turkeys will fatten upon it entirely; and in all sections where field feeding is practiced, there is no better stock to run in a corn-field than turkeys. Even where corn is worth a dollar a bushel, it has been found profitable to feed it to turkeys to fatten them for market. One considerable item in the account in all the old States would be the value of the manure made from such feeding.

The most important fact in turkey raising is not to overstock yourself, for then your flock of turkeys will become pests to yourself and neighbors—a set of marauding, piratical thieves.

A writer in the Germantown *Telegraph* furnishes that journal with the following statement:

"Much has been published of late in our agricultural journals respecting the alimentary properties of charcoal. It has been repeatedly asserted that domestic fowls may be fattened on it without any other food, and that, too, in a shorter time than on the most nutritive grain. I made an experiment, and must say that the result surprised me, as I had always been rather skeptical. Four turkeys were confined in a pen, and fed on meal, boiled potatoes, and oats. Four others of the same breed were at the same time confined in another pen and fed with the same articles, but with one pint of finely pulverized charcoal mixed daily with their meal and potatoes. They also had a plentiful supply of broken charcoal in their pen. The eight were killed on the same day, and there was a difference of one and a half pounds each in favor of the fowls that had been supplied with charcoal, they being much the fattest, and their meat greatly superior in point of tenderness and flavor."

R. H. Avery, of Wampsville, Madison County, N. Y., is entitled to the first prize of honor for improvement in the breed of turkeys. From a cross of the American wild turkey, made fourteen years ago upon the best domesticated birds of pure black color that could be obtained, and by careful attention to breeding since that time, he has succeeded in producing a male bird of superlative beauty, of glossy black plumage, which, at two and a half years old, weighed 34 lbs. alive; and a female bird, two years old, weighing $20\frac{1}{2}$ lbs. alive; and a female bird, one year old, dressed ready for the spit, $15\frac{1}{4}$ lbs. weight; and as the stock has been continuously improving both in size, beauty of form, and plumage for years, it is impossible to determine any limit. He has lately procured a pair of pure wild birds from Canada for the purpose of infusing a new strain of wild blood into his stock whenever he sees a chance to improve. The ordinary weight of male turkeys, two years old, as they are prepared for the market, will not exceed 15 lbs., and a female of 8 lbs. is accounted a very good one.

Just after the election of Mr. Buchanan, a cock turkey from Mr. Avery's farm, that weighed 35 lbs., was bought at $1 a pound, and sent to the President to serve as one of the members of his (kitchen) cabinet; and another of still larger size was presented to President Lincoln.

Turkeys grow big in Illinois, according to a correspondent who writes from Stebbinsville, who says that 28 to 36 lbs. is not an uncommon weight for a wild turkey, and one old gobbler that he shot weighed 41 lbs., and spread a tail over nine feet around the circle. He thinks some of the brag "improvers of the breed" had better send for some of the Illinois wild stock for a cross upon the biggest in all Yankeedom.

B. F. Langworthy, of Alfred Center, objects to our directions to scald turkeys. He says:

"Scalded turkeys and chickens sell about two cents a pound less in Boston than those picked dry—do not look as well, and certainly will not keep as long, nor please the customer as much; while the advance price will amply pay for the difference of time in dressing."

On the contrary, in New York, dry-picked poultry does not sell as well as that which is scalded.

190. **The Guinea-Fowl.**—A union of two breeds of fowls is seen in some measure united in the Guinea-fowl. It appears to have some of the characteristics of the turkey and the pheasant. Its head is bare like the turkey; its body and plumage, and general form and appearance, somewhat like the pheasant. The plumage of the most common sort in this country is of a bluish ground, delicately spotted with white. The wing feathers are nearly white. There are also fowls of this family entirely white. The greatest objection to the Guinea-fowl is the almost continual noise they make, which to some is intolerable. It is about as musical as the sharp squeak of a grindstone or old cart. The noise is, however, tolerated for their good qualities, which are not a few. Their noise tends to keep off hawks and other pests of the poultry-yard. They are very ornamental, and give a place a lively, pleasant appearance. Their flesh is pretty good for the table; they are good layers, and their eggs are large, and rich, and good for cookery, but not so good as common hens' eggs for the table.

The young chicks are hardy, and very pretty. There is no prettier sight in connection with poultry than a fine Guinea-hen with her brood. The hen sits a month, and nine eggs are enough for her to cover. The eggs may be hatched under a common hen, but a good sitter must be selected, because the time is longer than her own. Hard-boiled eggs chopped fine, bread crumbs, chopped meat or suet, are good food for young chicks. Some persons procure maggots on purpose to feed chicks. Any kind of small worms are devoured greedily by the young Guineas, which are real cormorants. They will eat a dozen times a-day, and a full supply of food is one of the great secrets of success in raising these as well as turkeys.

There is no domestic hen that gives such a bountiful supply of eggs all the year round as a Guinea-hen; consequently they are not good sitters, and other hens have to be used when it is desired to increase the stock rapidly.

191. **Ducks.**—Wherever suitable conveniences exist for keeping ducks, they are not only ornamental to the farm, but profitable. Some of the varieties are particularly ornamental—the little Wood duck the most so of all. The Pintail duck is a very neat-looking bird. The Aylesbury sort are pure white. The plumage of the drakes of some of the wild sorts which have been domesticated, is very beautiful. A few ornamental ducks might be kept upon almost every farm, and furnished with artificial water. We would never raise but a single brood or two a year, except we had natural water. A drake and pair of ducks, with their progeny, would cost but little, and the amount of good they would do is incalculable. They are great destroyers of slugs, snails, worms, and all larvæ; and if you should see an old duck pitch into a nest of young mice, you would learn what good she can do in that way of ridding the farm of pests.

Ducks' eggs are not esteemed for the table, but are in cookery. The birds when well fatted are always salable, or good for home consumption, and pay as well for the corn they eat as anything in the poultry-yard.

In selecting a variety of ducks, the purposes for which they are to be bred must be considered. If for ornament, select the prettiest. If for scavengers, we would use the common gray duck and drake with green head.

The best white duck is the Aylesbury. It has yellow legs and feet and flesh-colored bill. White ducks should never be kept except where water and grass are both abundant. In the water or on a lawn they are pretty. In a muddy yard they are not so.

There is a great variety of colors, but we recommend you to confine yours to a single color, whether white, black, gray, blue, or slate. The feathers of ducks are as good as geese feathers, and some housewives pluck them in the same way.

The duck sits thirty days; and the hen should be confined an equal length of time, where the ducklets can go out, and into natural or artificial water. You can not feed them too much, and they are no way dainty. When large enough, give them a wide range, bringing them home at night. The best food for grown ducks is Indian corn, and the best ducks for the table are domesticated wild ones, fatted on corn, or wild ones that have had a full range in corn-fields. Beech-mast also makes the flesh of wild ducks excellent.

192. **Geese.**—As geese are generally kept by farmers, they are neither profitable nor ornamental, but, on the contrary, an unmitigated nuisance, befouling grass and water, door-yards and roadsides, and always poking their heads through holes into mischief.

Geese never should be kept upon or about any farm, except in a lot appropriated to their particular use. A man who would turn out a flock of geese upon the public highway to pirate their living, we would not trust about our hen-roost of a dark night.

If geese are kept on a large scale, where water is good, and pastured like any other stock, and finally fatted for market, upon the same principle that pigs are fed and fatted, we will insure the largest profit from the geese, particularly if the best breeds are selected.

The Chinese or Hong-Kong geese and the Bremen geese are much larger varieties than the breed common in this country. The Bremen geese have pure white plumage, with clean yellow legs and bills. They attain to great weight and age—twenty or thirty years, and as many pounds. The flesh of a young, fat Bremen goose is esteemed above all the domesticated tribe, and the feathers are salable at the very highest rates.

This breed is very prolific, laying twelve or fifteen eggs a year, and the geese are good sitters and nurses. They are somewhat inclined to commence laying too early in the season. To prevent this, shut the whole flock in a dark room, about the twentieth of February, and feed and water once a day, and allow them an hour out once a week to wash and have a run. In a few

A GROUP OF DOMESTIC FOWLS

1 Peacock
2 2 White and Black Swan
3 Aylesbury Duck
4 Mallard Duck

9 Hong Kong or China Goose

5 5 Domestic Turkeys
6 6 Guinea Fowls
7 7 Bremen Geese
8 Rouen Duck

PLATE XI.

(Page 140.)

Here is another picture, more beautiful, if possible, than No. X. It comprises some of the most ornamental, and some of the most substantially useful birds that help to adorn our landscape. Many who read this book will have no opportunity to see the graceful swans that adorn the ponds in Central Park, New York. Let them study these life-pictures. The peacock is more common, yet many will get their first idea of its appearance from this picture. The Hong-Kong goose is also rare, and so are some of the ducks, and in many places the Guinea fowls are unknown. The turkey is common, still his likeness adds to the beauty of this scene.

days after they are let out of jail, the geese will make nests and begin their work.

The eggs should be removed carefully every day, and deposited in cotton in a dry, temperate room. Then when all your flock are ready to sit, which they will be about the same day, have capacious nests filled with chaffed straw, in which place twelve eggs for each goose. Where a good many geese are kept, it will pay to have an attendant, who should be careful to allow only one sitter to leave the nest at one time. When one comes off, shut the doors of the other boxes till she returns. This will prevent confusion of getting on the wrong nests. By attention, nearly all the goslings of a large flock may be brought out in one day.

Goslings should be left in the nest twenty-four hours after they hatch, particularly if the weather is rough; and as they are tender animals, they should be carefully nursed for a month, allowing them a small pool of water to bathe in, and plenty of green grass. The whole *anser* family belong to the graziers. It is not necessary to feed goslings on much grain.

The white China goose is as pure white as the Bremen, and should not be mistaken for that—the Bremen is preferable.

The Brent and Sandwich Island goose are both very small varieties, well suited to situations on the salt water.

The Berwick goose is said to be a great weed-eater.

The Canadian or wild goose variety are quite ornamental upon a well-watered location. This breed are greater worm and insect eaters than any other variety of the *anser* family. The hens do not lay until two years old in their domesticated state.

193. **Swans.**—This variety of ornamental birds has been but little cultivated in this country. The greatest collection is at the New York Central Park. This bird, of all others, puts the finishing stroke to the landscape inclosing a still lake or pond.

There are white and black swans; both are magnificent, but the white ones are the most showy on the water, where they float by the hour as still as the water beneath them. Although domestic and tame, swans are apt to go astray—to prevent which the last joint of one wing is skillfully dissected. They are weed-feeders, but in places where they are generally kept they require feeding. Their feed is most abundant in foul, shallow water, and they are often seen abroad at night in pursuit of food. Besides vegetables, they eat minute insects found in the water, and probably fish-spawn.

The hen birds are very curious about their nests, and will select them, if possible, in some low bushy islet or headland, and under favorable circumstances will hatch eight or nine young cygnets—the name which young swans are known by. The male birds allow no intruders about the nests or young. A man would find a terrible antagonist if attacked by a swan while swimming.

The cygnets, when fat, are esteemed a great delicacy upon the table, stuffed with the lean part of a round of beef, seasoned merely with cayenne pepper and salt, and served with rich gravy and currant jelly.

194. **The Pleasures of Poultry Raising.**—Besides the profit of a well-conducted poultry business, there is an actual pleasure attending it over that of keeping any other kind of domestic animals. Although the aim appears always to be profit, we think if those who can keep poultry would look at it in another point of view, they would be better satisfied if it did not always *pay*. One advocates having a lawn and a flower garden attached to his house, saying that it will give new life and beauty to all around, and exert a beautiful and ennobling influence upon every member of the household, and even visitors and passers-by will catch from it a sweet spirit of love and good-will; but the question with the calculating and careful farmer is, *Will it pay?* So with every improvement upon his house and around his farm; if he does not see a prospect ahead of a return in hard money for his outlay of time and his work, the close-calculating man sets it down as being a thing that won't pay, and consequently abandons it entirely.

It is just so in regard to poultry. Nothing is kept for ornament; yet we have already shown that several varieties are not only ornamental, but profitable. But setting all other considerations aside, we would keep poultry just for the pleasure attending the sight of the birds, particularly the dear little chicks. Quoting from a sensible writer upon this subject, we adopt his words:

"One of my neighbors says it will pay to keep just as many hens as will get their living around the barn through the winter; but he thinks it will not pay to keep them if they have to be fed. I will own that I have a few notions in common with all poultry fanciers; I look somewhat to the profit, but make it a point of secondary importance. Farmers, in general, who keep hens, are more troubled with them than with any other one thing upon their farms, considering the amount of work which they do. They are always scratching in the garden, digging up corn, or committing other depredations which keep the farmer and his girls running to keep them out of mischief."

Of course they are, because they must scratch for a living. If you don't want hens in mischief, feed them; and at times when it is really necessary, shut them in a poultry-yard and feed them, and adopt this simple rule for feeding fowls, known to most housewives in the country who have charge of the poultry, but it may be useful to amateurs, and as it is very short, we print it. Here it is: Don't feed too much. That is all; though we may add that food should never be given to fowls unless they are hungry enough to "run crazy" after it; and just as soon as they stop running crazy, you stop throwing feed, and never—no, never—leave feed lying by your fowls "for them to eat at leisure." This same rule does pretty well for all other domestic animals—children included.

If you don't feed your hens, and let them run in the garden, and they scratch, don't swear. It is natural for them to scratch, and although they do mischief, they also do good. Then, don't set the dog upon them; it only makes matters worse. There is a cure for your trouble: build a yard in which to shut the hens when they are troublesome in the garden, and train them so that they will follow you like a dog, and then just at night take them out on a walk and see what an immense number of hurtful insects they will destroy. Your hens are the most profitable stock you have if you treat them rightly. Don't swear at them; keep your temper and build a poultry-yard, but don't keep it always closed. It is better for you, and the hens too, to let them run at large at all times when they are not liable to do mischief.

We know of nothing around a country residence which gives the whole such a delightful and pleasant aspect as all kinds of poultry. How Downing loved them when he wrote: "With proper conveniences for managing them, they are among the most agreeable, profitable, and useful objects in country life. To children especially, fowls are objects of exceeding interest, and form an almost necessary part of the means of developing the moral and industrial energies of a country household." Oh, who would be without them? What country resident would neglect to have a noble collection of hens, ducks, and turkeys—with right modes to keep and manage them—to give a lively aspect to the scenery of his home, and impart beauty to the whole place? The merry cackle of the "old yellow hen" in the beautiful spring-time; the love and kind protection manifested for her brood of young, and then to see them huddle together under her wing! The shrill sound of the cock as he proclaims the dawn of morning! Oh, who would not keep poultry, even if it *didn't pay?* We would not keep

Shanghaes.—These Chinese monstrosities, on the contrary, we recommend every one to get rid of as soon as possible. They have had their day, and in spite of their crowing, Barnum's showing, and their owners' blowing, they are about blown out. It begins to be found out that 10 lbs. of meat can be produced upon two pairs of legs just as cheaply, and of much better quality, than upon one pair. No Shanghae, Cochin-China, Chittagong, or any other imported breed of fowls has ever been, or will ever be, more esteemed on all accounts than the old yellow-legged Dominique, a domestic, handsome, and good-sized fowl.

A particular friend, candid and intelligent, said to us lately: "I have tried almost all varieties of hens, and have settled upon the Black Spanish, or crosses of them upon the old stock, such as I can pick up in market at fifty cents a pair. I have also tried the experiment of keeping hens in the city and the cost of eggs. I keep them in a house at the back of the yard, letting them out for exercise just before roosting time, feeding them on scraps from the kitchen, potatoes, meat, etc., and corn, and find my eggs cost just three cents a dozen on an average through the year."

Another one, alluding to the fact of feeding poultry upon dead horses at a great poultry establishment near Paris, said: "The less hens I keep, I think the better for me. I have fed dead horses and all sorts of food, but I can't make it profitable to myself, or neighbors either." Of course not. The last words tell the reason; he lets them run at large, half fed.

195. **Hen-Roosts and Poultry Vermin.**—The poles or ladders should be

such that they can be whitewashed thoroughly every June, and the whole hen-house should undergo the same operation. Poultry that are lousy should have wood-ashes to wallow in, and a few handfuls of flour of sulphur stirred in among them makes them much more efficient. Good ashes will effect a cure, however. The fowls should have also dry earth or a dusty road, for it will be found that they will usually alternate from one to the other. The best means for supplying lime to hens is to crack up fresh oyster-shells with a hammer or a sledge. Nests never should be made or allowed in the room where fowls roost. Keep it clean of all trash, straw, or nest-boxes. Have them in another apartment.

A poultry raiser asks us to tell him how to get rid of the great nuisance of lice upon poultry. He says he feeds well, and gives the hens the range of a grass lot, and has used turpentine sprinkled in the nests, and applied blue vitriol mixed with grease to their bodies, and anointed them with lamp oil, and yet they are infested. The breed is that called Black Spanish, but that, we think, has nothing to do with the difficulty, which is so great that he is ready, if there is no remedy, to sacrifice his hens and buy his eggs and chickens. In a case like this, we should endeavor to purify the roost of everything that could give shelter to an insect, and perhaps abandon the old roost altogether, and take care that the hens had a wallowing-box, well supplied with dry wood-ashes, renewed by a little addition every day or two, and feed sulphur occasionally in the food, and have a constant supply of lime for the hens, and keep them fat; and if all these would not preserve them free of lice, we would abandon the business.

We have received several letters upon the important subject noticed under this head, giving "infallible" remedies to rid poultry of lice. The following looks as if it might be a "dead shot:"

"I have had the care of a poultry-yard for a number of years. During that time a continual war of extermination was waged, and many expedients were resorted to, but never did anything, in a single instance, prove a safeguard until tobacco was tried. This weed, in my case, has never failed in answering all practical purposes; and this fact goes far to show that it was intended to act out higher and nobler ones than are commonly assigned to it. The fine-cut is the best kind, and in using it spread it thickly over the surface of the nests, scatter it upon the floor, and suspend large leaves about the different parts of the house. This, used in connection with your directions, will put the enemy to flight, and with it will disappear all the annoyances your subscriber complains of."

Another letter says: "Sprinkle Scotch snuff plentifully on the fowls, so it will reach the skin, and I'll warrant that the vermin will be more scarce than even money in these 'tight times.' As you say, 'the roost must be kept clean;' also lime must be sprinkled on it to destroy the effect of the ammonia arising from their manure."

Another says: "All the remedies named are not equal to onions, chopped fine and mixed with their food every day for a week. This will exterminate them entirely from the hens; and if the roosts and pen be washed with onion water, they will trouble your hens no more."

Another writer says, hens that roost upon sassafras poles are never troubled with lice.

Now all these facts are worth knowing, as the vermin some years are uncommonly numerous, and will eat more poultry than the people will, unless we can head them off with some of the remedies named.

196. **Water your Door-Yard Fowls.**—Fill a bottle with water and place it bottom up through a hole in a board, so that its nose shall be inserted into a saucer, or any shallow, open vessel. As the fowls exhaust the water from the shallow vessel, the bottle will pay out new supplies.

197. **Mode of Killing Fowls.**—A favorite mode of killing fowls with some persons is sticking an awl in the neck. They say that the blood adds to the good looks and value of all sorts of poultry.

198. **Corn-Fed Geese—Value of Corn.**—The following detail of an experiment in feeding corn to geese, by Rufus Brown, of Chelsea, Orange County, Vt., is well worthy the attention of all farmers, and goes to prove that corn may be as profitably fed to poultry as pigs. Mr. Brown writes:

"In answer to your question, 'Does anybody know anything about anything?' I answer, Yes. I know how much ten quarts of corn is worth. On the 22d of November I shut up a flock of goslings, which, allowing the usual shrinkage for dressing, would not have dressed over six pounds per head, and would have been called scalawags, and sold accordingly at six to seven cents per pound. Taking the maximum (seven cents), they would have brought 42 cents each, dressed, at the time mentioned. They were put in a warm, well-littered stable, allowing three to four square feet of room for each, and kept constantly furnished with corn in the kernel and plenty of water; this constituted their entire feed. They were thus kept till Dec. 9; they had then consumed 10 quarts each; when, after allowing them one day of fasting, they were dressed according to the custom practiced from boyhood, and which I respectfully recommend to others, viz.: after life had become extinct they were carefully scalded by immersing head first in boiling water, and allowed to remain about one minute, and then taken out head first and allowed to drain, and then covered in a thick woolen blanket and allowed to remain about five minutes; then carefully picked clean; then the intestines were drawn, their legs tied together and laid upon their backs on boards in a cool place, with their necks turned under and laid close together to keep the wings close to their sides. They were then considered choice, and sold readily to the dealer at $10\frac{1}{2}$ cents per lb., and averaged 10 lbs., amounting to $1 05 each. Deduct 42 cents, and this leaves 63 cents for the 10 quarts of corn, the market-price of which, at the time of feeding, was 75 cents a bushel.

199. **Prices of Poultry.**—At the time of the great "poultry show" at Barnum's Museum, in 1857, there was an auction sale, and the following prices were realized, and although fancy birds brought fancy prices upon the more

common sort there was a dead loss upon the cost in England of about an average of 7 per cent. The following are decidedly among the fancies:

1 pair of white swans, $100; 1 white female swan, $50; 1 black female swan, $60; 1 pair of black swans, $99; 1 pair of Japanese peacocks, $100; 1 pair of Barnacle geese, $40; 3 hoop-bill ducks, $75; 1 pair of golden pheasants, $18; 4 pair of English pheasants, at $10, $11, and $15 per pair; 3 male golden pheasants, at $5, $8 50, and $12 50 each; 3 male silver pheasants, at $10, $10 50, and $16 each; 1 pair of Call ducks, $15; 1 sheldrake duck, $10; 3 spoon-bill ducks, $15; 1 pair of pin-tail ducks, $19; 1 pair of widgeon ducks, $12; 1 pair of widgeon ducks, $7; 3 widgeon ducks, $9.

But the climax of fancy prices was reached in the sale of one pair of Mandarin ducks for $150. This was a beautiful pair of very rare birds, and we hope will remain rare—that is, that no more will ever be imported at that price. It was said that they cost 75 guineas in England. Mr. Barnum offered $35 advance upon the purchaser's bargain. They are about the size of our common wood duck, and of just about equal beauty. It is certainly somewhat extraordinary that, with money "tight" with most people, any one can find loose change enough to buy ducks at $150 a pair.

The sales of Shanghaes, and birds in that line, went off at what the owner called "sickly prices." The following indicate the prevailing rates:

1 pair of gray Dorkings, $10; 3 gray Dorkings, $15; 6 Sebright bantams, in two lots, $5 each; 2 Sebright bantams, hens, $2 each; 3 Golden bantams, $1 67 each; 3 English bantams, $1 25 each; 3 English bantams, $2 37 each; 4 Bramahpootras, 1 cock and 3 hens, $2 50 each; 1 Poland hen, $1 25; 1 Bolton Gray hen, $1 25; 1 pair of Golden Hamburghs, $2 25; 1 pair of black Spanish fowls, $10; 1 pair of black Spanish fowls, $5 50; 2 black Shanghae hens, $3.

Turkeys.—1 pair of beautiful white turkeys, $5.

Geese.—2 pair of Barnacle geese, $12 and $14; 2 pair of Egyptian geese, $10 and $16.

200. **Consumption of Poultry in New York.**—To give some idea of the quantity of poultry consumed in New York, we give the following extracts from an article published about Christmas, 1857:

"On Dec. 23d the American Express Company had three car-loads to deliver from their dépôt in Duane Street, and about 11 tuns received from Albany by the steamer. On Dec. 24th their receipts are stated in round numbers at 40 tuns, making about 80 tuns received in two days by only one transportation line.

"This Company's freight was nearly all from this State and Vermont, with a little from western Pennsylvania, and a very small portion from Ohio. A large quantity also came from the river counties by steamers and barges on the Hudson, as the mildness of the winter has enabled them to keep running. Western New York also sent in great quantities by the Erie Railroad, while every New Jersey railroad and numerous wagons brought vast quantities from that State, and some from Pennsylvania. A great deal also came from Long Island, and considerable from Connecticut.

"The Messrs. Beatty, who make a business of feeding poultry, had on sale at once by a commission-house, two days before Christmas, four tuns, all prepared upon their own premises, and some of the turkeys were as handsome birds as we ever saw, and sold for $3 and $3 50 each."

Mr. White, of Chautauqua County, another great poultry feeder and packer, had as much more. It is really a blessing, both to producer and consumer, to have such men as those engaged in the business. The farmer particularly reaps a decided advantage, because such skillful poulterers can and do give them more for their birds than they would get if killed by themselves and sent to market in the rough condition that much of the poultry comes into this market. For instance, we noticed, while one commission-house was selling well-prepared geese at 13 cents, a lot of geese, side by side of these, were offered and refused at 6½ cents, the fault being that they were not well fatted, and were picked dry and roughly packed.

Another lot of well-fatted poultry, well packed, and received in good condition from Vermont, the owner was fully convinced would have netted him from one to two cents a pound more if he had followed the directions given in No. 201, for killing and preparing poultry for market.

Relative to the effect of the weather upon the business of fatting poultry and some other facts, we are indebted to the Messrs. Beatty for the following. They say:

"Owing to the lateness of the season, turkeys did not grow sufficiently to fat well for the early market. It is unprofitable to feed these birds to fatten them until they get their growth; and in such warm weather as we have had this season they do not fatten well, being inclined to wander. To fat turkeys well and cheaply we must have cold weather. It is owing to this, and having to feed a longer time, that we have not been as successful as last year; and it was so warm when our Christmas lot was dressed, consisting of four tuns, that with all our appliances it required not only experienced skill, but great care to preserve the whole in good order till ready for shipment. The fault with that lot [alluding to one then unpacking] is, that the birds were packed before all the animal heat was out of them. This must be carefully guarded against in such weather as we have had this season.

"It has been very difficult for farmers to raise turkeys the past summer on account of cold and wet, so that the stock in the country is probably not more than half as large as it was last year, and that is the only reason that the price, notwithstanding the money pressure, has kept up so well. We have fed this year 1,000 turkeys in one lot together, having had in all 1,300, and between 200 and 300 geese, with other poultry in proportion. We use, and recommend to others, to feed good, sound Indian corn, and with it a liberal supply of charcoal, which we consider indispensable. It promotes health and improves the quality of the flesh."

Will all poultry-raisers remember this important fact, which alone is worth more to them than all we shall ever receive for preparing this volume of valuable information?

201. **Preparing Poultry for Market.**—We have repeatedly published directions for preparing poultry for market, and we can not make a more valuable finish to this section upon poultry than by giving in brief such directions as all must rigidly follow, who send such farm produce to the great market of New York. The professional poultry feeders and packers need no instructions, but many farmers do. Many of them have already saved a handsome per-centage on the value of their poultry by giving it a proper preparation, and others may.

As a preliminary rule, and make it unalterable, never kill a bird unless it is fat. Never cut off the head of a turkey or goose, but hang them by the heels where they can not bruise themselves in the death-struggle, and stick them with a small knife and bleed them to death. Ducks and common fowls, if decapitated, should be held or tied and hung up to bleed to death. Never kill your birds until quite fat; you will lose in price, in reputation, and in weight. Never strangle them, so as to leave the blood in. The best plan is to tie all kinds of birds to a line drawn from post to post or tree to tree, and stick them just in the forward end of the neck, either with a broad-bladed awl or a penknife. It is undoubtedly the best mode of killing. If the head is cut off, the skin recedes, and the neck-bone looks repulsive. To obtain the best prices, the birds must look good as well as be good.

There is an exception, however, to the above recommendation about sticking, for some dealers prefer the birds with heads on, and some do not. In some towns it is always customary to cut off all the heads. When this is to be done, draw the skin back from the head as far as possible, so that when you cut off the head, which should be done close to it, there will be some loose skin to draw over the end of the neck-bone, where it should be tied close. We doubt whether it is not worth while to pay freight upon heads. It is worth while to pay freight on the intestines, because the meat can not be kept sweet long after they are drawn and the air admitted inside of the body. Therefore, never draw a bird.

It is a practice of some of the best poultrymen, while the birds are bleeding, to hold them firmly by one hand, and pluck the feathers with the other, as they come out easily while the fowls are warm. This treatment is only for turkeys and common fowls. They are then ready for scalding. Take hold of the legs, and plunge the body in quick succession, two or three times, in boiling water. This should be done in a warm room, and the birds hung upon a line to pick clean, taking care not to tear the skin. Geese and ducks are plunged two or three times in boiling water, drawing them out by the head, and then wrapped in a woolen blanket to steam ten minutes. Take them on your lap to pick. Do not scald the legs, nor heat the bodies of birds against the sides of the kettle. After the birds are neatly picked, they are put through the plumping process. This gives them a finish, and increases their value in market.

The rule for "plumping" is to dip the birds about two seconds 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. The neatest poultry-dressers use both the hot and cold plunge. The poultry should be entirely cold, but not frozen before being packed. If poultry reaches market sound, without freezing, it will sell all the better.

After plumping, hang or lay the birds where they will dry, and then remove them to the cooling-room, laying the bodies nicely arranged upon clean boards in a cold room till perfectly cool, but not frozen, and then pack in boxes, with clean rye straw, about 300 or 400 lbs. in a box, filled full; mark the contents on a paper inside, and on the lid outside, and direct it to your commission-merchant plainly, and send it by express, and one invoice by mail, and place another in one of the boxes, if there is more than one, and mark on that, *invoice*, and then it will be opened first, and the merchant knows whence it comes, and what the consignment consists of. It is also a good plan to mark the contents of each box outside, thus: In box

No. 1—12 turkeys, 144 lbs.; 20 geese, 160 lbs.; 50 spring chickens, 125 lbs.

No. 2—100 fowls, 300 lbs.; 24 ducks, 96 lbs.

This lot will pack in two square dry-goods boxes. If clean hand-threshed rye straw can not be had, wheat or oat straw will answer, if clean and free from dust. Place a layer of straw at the bottom of the box, then alternate layers of poultry and straw—taking care to stow snugly, backs upward, filling vacancies with straw, and filling the package so that the cover will draw down snugly upon the contents. Common dry-goods boxes, holding not over 300 lbs., are the best packages.

Never kill your birds on a damp day, nor pack them, if you can avoid it, except in a clear, cold, dry atmosphere; and try to avoid night-work, when you are tired and your help sleepy, and all of you careless.

No matter how light your boxes are, they must look clean, or your poultry will not sell at first prices. In packing, press the wings close, and press the bird down hard on the breast, the legs extending back, and fill each course full, and then lay on straw and another course of birds. Nail tight, but don't let a nail project inward to tear the birds.

Give your name and residence in full on the bill in the box and on the invoice by mail. Don't think because you know in what State you live, that everybody else will know it if you name the town.

Never pack in barrels if you can get good dry-goods boxes, as the rolling of barrels injures the poultry, where it is likely to be much handled, unless very closely packed. Besides, it does not pack to as good advantage to the shape of the birds as it does in boxes. Small lots may be packed in "shoe or hat boxes," but they must be carefully hooped, and so should be all boxes. Don't use a rough, black board for a cover; you had better spend an hour to plane it. Don't acknowledge, by sending unplaned boards, that you don't own a plane. It is bad economy to use heavy packages, or have any waste room, because freight is charged by the pound, and for long distances the express charges may amount to four or five cents a pound, and all the weight of the box counts equally with the contents.

It is a practice with some—and a very foolish practice it is—to stuff fowls just before they are killed, thinking to sell corn at the price of meat. Better give no food for twenty-four hours previous to killing. Food in the crop is liable to sour, and always injures the sale, for it looks to purchasers as though there was a design to cheat.

You may pick turkeys and fowls dry if you will not tear the skin, and then scald them afterward by dipping them suddenly in and out of boiling water. Geese and ducks must always be scalded. Do not scald the legs too much, whether you pick first or afterward. Be careful of that. You must pick them clean, and the after-scalding makes them look plump and good. Well-packed boxes of well prepared birds will keep sweet a long time in cool weather, and may be transported by express from Ohio for three cents a pound; from Chicago and most of Illinois for five cents; from Iowa for six or six and a half cents, and arriving in good order, will be sold at good prices, and your money remitted to you, less 10 per cent. Now, following these directions, and getting these prices, if it is better for you Ohio, Indiana, Illinois, Iowa, Wisconsin, and Michigan farmers to send your poultry Eastward for sale, you know how to do it; and if it opens to you a new and improved market, it will be worth more to you than the whole cost of this volume upon every box of poultry sold. In fact, these directions, given in part heretofore to the public, have been the means of saving great sums of money to the poultry producers.

After boxes are packed, if there is any chance of not getting them immediately into market, or if a change in prices makes it desirable to hold back, it will be a good plan to place them where the contents will freeze solid; then they will stand a long spell of warm weather, such as makes badly-packed poultry slimy. If you could be sure of cold weather, so that the birds would remain frozen, very little straw would be requisite in packing; but as a general thing, a liberal allowance of straw will more than pay its cost of transportation in keeping the birds in good order.

When packages are frozen before shipment, it will be well to advise consignees of the fact, as we have known a thaw to come on gradually, until very warm, and have then seen packages opened in perfect order that were frozen up two or three months before. In fact, we knew one such that got mislaid and covered with empty boxes in a cellar, that kept sweet till it was accidentally discovered in May.

Water for scalding any kind of poultry should be as near to the boiling point as possible, without actually boiling; the bird being 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 it 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.

Do not send the birds with tail and wing feathers in, unless it may be occasionally in a very handsome turkey.

Geese always sell best the week before Christmas, and they should always be stall-fed. Christmas prices are usually for well-fed geese, such as will warrant their increased production, since it is contended by persons whose opinion is entitled to great respect, that with proper care and skill, upon a farm well fitted for the business, a tun of geese can be made at the same cost as a tun of beef, leaving the feathers as an excess of profit.

Now let all who read, remember that common-sense attention to these rules, in regard to preparing poultry, will often insure 25 per cent. higher prices than poultry of the same value originally will bring, if slovenly dressed and packed, and carelessly directed and stupidly forwarded, as often happens. To bring the highest market-prices, poultry must be good and well handled.

202. **Preparing Game for Market.**—Wild turkeys, wild ducks, and the smaller birds should be packed in the natural state. In cold weather they may be packed snugly, backs up, with or without clean straw, taking care to keep the plumage as smooth as possible. If the weather becomes warm during the transit, straw between the layers acts beneficially as an absorbent of moisture. Birds should never be drawn, and if mutilated by gun-shot, the market value will be much reduced.

Woodcock, quails, and other small birds are in cool weather sometimes each wrapped in paper, and packed in dry sawdust. In hot weather they may be packed without the paper in coarse sawdust and ice. They seldom arrive in good order if more than twenty-fours on the way in hot weather.

In venison it is best to send only the hind part of the carcass, including, say, two or three ribs with the saddle. The skin should be stripped from the fore part and carefully wrapped about the saddle, thus keeping it clean and in good order.

By the "game laws" of the State of New York, the killing of any wild deer, partridge, quail, woodcock, or snipe during the months of February, March, April, May, June, and July is prohibited under penalty of $25 for each offense.

Common carriers or their agents may, in the discharge of their legitimate business, transport deer or game during the inhibited period without violation of the law; and commission merchants and dealers are protected if they can show, to the satisfaction of the court, that the game in question came from any other State, or foreign country, or that it was not killed during the inhibited period.

The taking of speckled or brook trout is prohibited between the 15th day of September and the 15th day of February, under the same penalties and provisions as in the case of game; but the Cayuga, Seneca, Crooked, and Otsego lakes are excepted from this prohibition.

203. **Eggs—How to Produce them in Winter.**—Pork scraps or greaves, fed in moderate quantity, are found to have a marvelous effect in the production of winter eggs. Give hens also sand, and gravel, and lime, and see that they have water. Egg-shells should never be fed whole, but they may be mashed up fine and mixed with feed to good advantage. Some hens are much more productive of eggs than others. Eighty hens, belonging to Capt. Thos. A. Norton, of Yarmouth, Mass., have laid during one year 637 dozen eggs. At the average price of eggs, that would be about $1 25 for each hen.

204. **How to Detect the Sex in Domestic Fowls' Eggs.**—A person who has paid attention to the subject declares that he can tell the sex of eggs in the following manner. He says:

"I began examining eggs, classing them according to the difference I found in the formation of each, marking each class, and putting them under hens as soon as opportunity offered; when, in less than twelve months, I was fully convinced that I had discovered either *a* method or *the* method of foretelling the sex in the egg, which was proved by ocular demonstration in the chickens produced.

"At the large end of the egg there is a circular space or cavity containing air, which country folks call the 'crown' of the egg; its proper name I know not. When you examine the egg, hold it, the large end uppermost, before a candle or gaslight, and in looking through it you will observe a dark circular mark, something similar to the moon when partially eclipsed. This dark circular mark is the space filled with air or 'the crown' of the egg, and when in the center it indicates that the egg will produce a male.

"My method of examining the egg is as follows: I make use of the thumb and forefinger of my left hand as two points, placing the small end of the egg on my thumb, my forefinger covering the large end of it, and as near the center of the end as possible. I then place the egg in this position steadily before a candle and gently turn it around; if the crown be in the center it will be scarcely visible, the forefinger nearly covering it. On the contrary, if the crown be on the side you will only see it on one side of the egg as you turn it around." There is a little contrivance, called the oöniscope, to detect bad eggs. The egg is placed in a hole of a box, and the light reflects on a mirror inside and tells unerringly the true condition of the egg. A little practice enables any one to discover whether eggs are fresh or not.

205. **Vitality of Eggs Affected by Transportation.**—It has been stated upon good authority that railroad transportation injures the vitality of eggs. That pack them as you will, if they are carried any considerable distance, say 100 miles, the continued shaking will shake the life out of them. Traveling on the Harlem Road one day, we met an acquaintance carefully carrying a small basket in his hands. We remarked that he handled his basket as carefully as though he was carrying eggs. "And so I am," he replied; "I am taking them about a hundred miles to a friend, and will insure every one to

hatch out a chicken, so far as transportation may affect them. But I learned this by experience. I had a lot sent up the road only twenty-five miles, in the ordinary way, and did not get one chicken to fifty eggs, while out of another lot, carried in my hands in this way, not one missed." He said: "As a general rule, it may be set down for fact, that eggs that have been transported by railroad will never bring forth chickens." This is important information, and should be well remembered. So, too, let it be remembered that eggs intended for incubation can not be too carefully handled in taking them from the nests and keeping them about the house till the hen is ready to take them in charge.

206. **Selling Eggs by Weight.**—We have frequently recommended that eggs should always be sold by weight, instead of by count. We recommended it because we thought it more fair both for producer and consumer; but really, with the present system of trade, we do not see much to encourage the change, and nothing to encourage the production of eggs of a large size while small ones sell at the same price as the largest, per dozen or hundred, and consumers are guilty of the great folly of making no distinction. Do they ever think of the difference in weight? Do they know how many eggs there should be to the pound? The largest-sized eggs of the common barn-door fowl weigh three ounces each, but the average is about ten to the pound. We inquired once of a retail groceryman, "Have you any fresh eggs?" "Yes; there is a lot of fine ones, just in, all of this State, in good order." "At what price?" "Twelve cents a dozen." "May I pick them out at that?" "Oh, yes, certainly; they are all alike, good." Of this we had no doubt as to the good; but that they were otherwise alike, we intended to prove that he was mistaken. So we picked out a dozen and laid them in the scales, with a 1½ lb. weight opposite, thinking they were just the size that takes eight to the pound, for that is just what good, fair-sized hen's-eggs always will average. These were a little heavier, and we added two more, and balanced two pounds—seven eggs to the pound. Then we picked out of the same cask thirteen more, and these weighed just one pound, not quite 100 per cent. difference whether you buy large or small eggs. Now, if farmers and fools meet, is it right that the one should take advantage of the other in this way? or is it right that one man should keep a brood of small hens, the keeping of which costs less than half that of larger ones, and get the same price for the eggs? If honesty is the best policy in all of our dealings, then it is the best policy to sell eggs by the pound, and not by the dozen.

207. **To Preserve Eggs.**—We can not vouch for the following. If it is as stated, it is much more simple and convenient than packing in lime, salt, etc. "Provide a small cupboard, safe, or tier of shelves; bore these shelves full of holes one and a quarter inches in diameter, and place the eggs in them, point downward. They will keep sound for several months. Other modes, such as packing in salt, etc., depend for their success simply on placing the points down; the shelves are more convenient and accessible."

208. **Eggs Consumed in England.**—In the statistics of British commerce,

the home production is put down at 75,000 tuns annually, which are valued at $15,000,000. The importation of eggs for eight years, ending with 1847, ranged from 96,000,000 in 1840, to 77,500,000 in 1847, and the importations of the succeeding years are given in the following table:

	Number.		Number.
1848	88,012,585	1852	108,281,233
1849	97,745,849	1853	123,450,678
1850	105,689,060	1854	121,966,226
1851	115,526,246	1855	100,005,200

The first six months of 1856, 68,062,600. This was nearly 14,000,000 in excess of the number received in the first six months of 1855, but not so large as in 1854. The imports of eggs in 1854 were, from

	Number.		Number.
Belgium	10,415,517	Spain	5,983,161
France	104,126,918	Channel Islands	794,400
Portugal	419,866	Other parts	226,424

Up to the 8th of August, 1854, eggs were entered by number, but since that they have been entered by cubic feet, internal measurement. In order to reduce the whole to a uniform standard, 200 eggs are estimated to be packed in one cubic foot. The duty charged is 8d. per cubic foot of eggs from foreign countries, and half that duty from British possessions. In the metropolis the egg trade is a very important branch of commerce, giving employment to sixty egg merchants and salesmen on a large scale, exclusive of the number of shopkeepers who sell eggs. These salesmen distribute the boxes of eggs over the various consuming localities in light carts.

The principal importation is from France and Belgium. Quantities of Portuguese eggs are occasionally imported into England by the Peninsular Mail steamers. The eggs of the Spanish fowls being very large, are much esteemed, and valued at 1d. to 1½d. each. Spain imports a certain quantity from the French province of Oran, in Algeria. The eggs of the Bedouin fowls are sold in the European markets at 5d. to 6d. the dozen.

The supplies of eggs sent from Ireland to Liverpool, and thence into the manufacturing districts, are enormous, frequently exceeding 1,000,000 a day. They are packed with straw in crates, boxes, or hampers. The crates contain from 6,000 to 8,000 eggs, the boxes about 2,500. Sometimes large boxes contain 13,000 or more eggs.

In 1852, 9,260 tuns of Irish eggs were imported into Liverpool, and it is estimated that that is not more than one fifth of the product of that island.

209. **Eggs in France.**—M. Legrand, a French statistical writer, estimated the consumption of eggs in 1835 in Paris at 138 per head of all the inhabitants, and in the provinces at double that ratio. "The consumption of eggs for the whole kingdom," he observes, "is estimated at 7,231,160,000; add to this number those exported and those necessary for reproduction, and it will result that 7,380,925,000 were laid in France during the year 1835."

Since that time the production has largely increased. M. Armand Husson, in his interesting book on the "Consommation" of Paris, just published, returns the number of eggs consumed in the French metropolis at 175,000,000, or 175 to each head of the population, worth about $1 35. The value of the eggs consumed in Paris one year would be also about £300,000; but probably three quarters of a million sterling would be a nearer estimate of the poultry and eggs consumed annually in Paris.

The consumption and prices may be judged of from the following figures:

	Number.	Av. pr. per 1,000.		Number.	Av. pr. per 1,000.
1847	120,940,724	57 francs.	1851	129,732,299	42f. 69 centimes.
1848	106,747,222	48f. 40 centimes.	1852	160,000,000	41f. 35 centimes.
1849	113,587,732	46f. 70 centimes.	1853	175,000,000	
1850	124,597,150	43f. 93 centimes.			

A number of *Galignani's Messenger* says that, in 1815, the number of eggs exported from France was 1,700,000; in 1816 it rose to 8,000,000. Six years later, in 1822, the number was 55,000,000; and 99,500,000 in 1824. In 1830 the number declined to 55,000,000; then gradually increased until 1845, when it was 88,200,000, for which an export duty of 114,000 francs was paid. Nearly all these eggs go to England. The yearly consumption of eggs in Paris is estimated at 165,000,000, and the total consumption of all France at 9,000,000,000; so that, reckoning eggs at a sou, this single article represents 465,000,000 francs.

210. **The Egg Trade in this Country.**—Steamboats and railways have done much to increase and improve the trade in poultry and eggs, in butter and milk, as well as in carcass meat and fish of all kinds, for the supply of large cities and dense populations in Europe and America, situate far from the chief seats of production or fishing. The poultry dealers of New York made their appearance on the shores of the great American lakes within a few days after the regular trains were in motion on the Erie Railroad. Poultry and eggs were swept away by them at an advance of 25 to 30 per cent. on their ordinary value, and a decided stimulus has been given to the production of poultry and eggs.

The British American provinces are now supplying the United States towns with eggs, which are imported duty free under the Reciprocity Treaty. 1,260 dozen eggs from Nova Scotia were entered very recently at the Custom-house, Boston, in one day. In the season of 1852, about 8,000 barrels of eggs, containing 84 dozen per barrel, were shipped from the port of Montreal to the United States, and sold at about 16c. the dozen.

One merchant in Marion County, Ohio, has shipped in one season 124,950 dozen of eggs, in 1,785 barrels, costing, at 7 cents a dozen, $8,746 50.

211. **Packing Eggs for Market.**—There is probably in no one article of the same relative value so much depreciation and loss from injudicious management and unskillful packing as in eggs. This is best illustrated in the Western trade, especially during the warm season, when the *average* price of Western eggs rules, say, three to five cents per dozen below those from this State; but at the same time we have some Western marks that bring nearly or quite as much as the best State, showing conclusively that it is entirely practicable to forward them in prime order from the far West. If the fol-

lowing directions are intelligently carried out, there will be very little doubt of success.

Be sure (especially in the summer season) that your eggs are not only sound, but recently laid. Eggs may be "candled" or examined by the "ooniscope," and repacked at the West; but if they are *stale*, though still apparently sound, they will be sure to reach this market in bad order, or will so rapidly change, on being opened, that dealers will be sure to lose money on them. The motion of the cars over such long distances so muddles all eggs, not entirely fresh, that they appear cloudy and stale, and will soon spoil, if indeed they are not already unsalable.

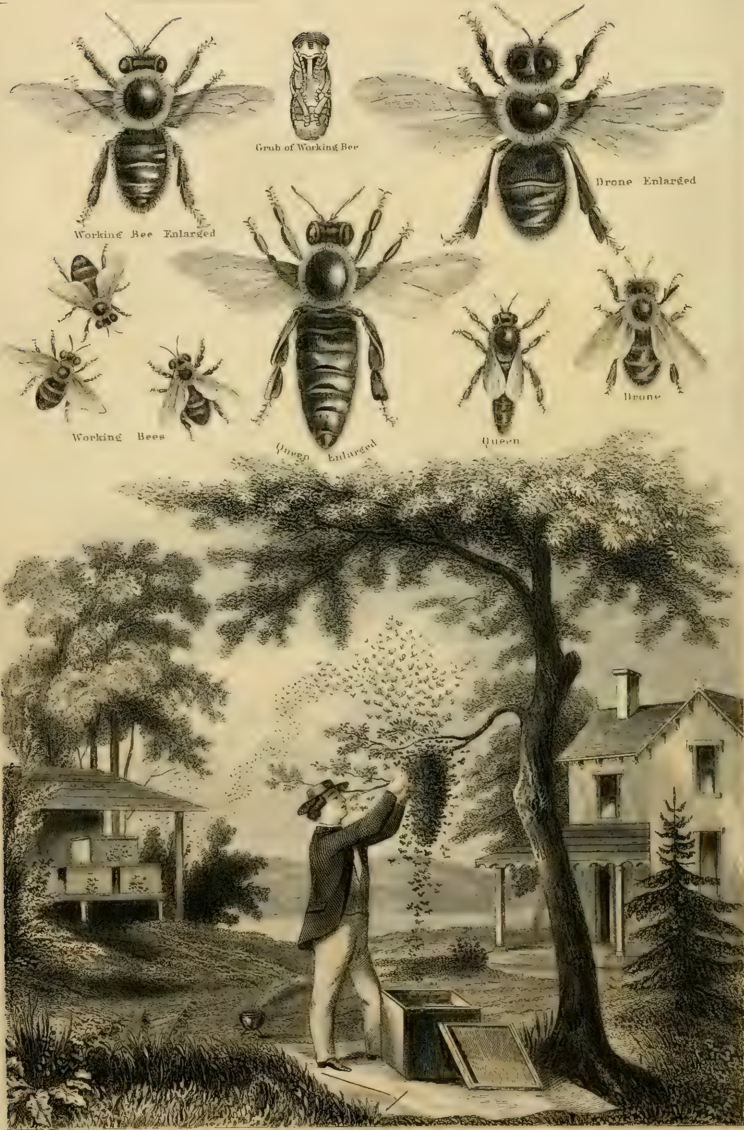
Use very strong, stiff barrels, put a little soft straw or hay evenly over the bottom with a stiff paper on the top of the straw, then oats or cut straw, say, two to three inches, then a layer of eggs, laid snugly together upon the sides, evenly imbedded in the oats, with the ends toward but about one inch from the staves. Cover the layer with oats and shake down gently but thoroughly, leaving, say, one inch of oats upon the layer of eggs; thus continue shaking down thoroughly with each layer until the barrel is full. Place about three inches of oats over the last layer, then a stiff paper and a little soft hay or straw next the head, filling so high that the head must be pressed to its place by a lever or other mechanical power, that the contents may be held so firmly that they can never shift or loosen in the barrels. In the winter, to guard against frost, use more packing, leaving the eggs farther from the sides of the barrels. Use clean, bright oats; they are salable at all seasons, though of late merchants seem to prefer cut straw. Mark plainly the number of dozen and the quantity of oats in each barrel. Be very particular to have the count right. A good reputation for accuracy is very valuable.

One person says: "I use a board some six or eight inches square, with a loop or staple in the center for pressing each layer of oats firmly down. There will be something gained by lifting and dropping the barrel square on the end, but not by shaking, as it disturbs the layers. When it gets too heavy to lift, use a board three fourths as large as the head, and get on it, increasing your weight with a spring, and on the head driving it in. The secret lies all in packing the oats. Oats are better worth sending to market than hay, and just as safe. I have sent ten barrels at a time without losing a single egg. You must pack tight. Remember that."

PLATE XII.

(Page 157.)

This picture is intended to be both suggestive and instructive. First, it suggests to any one who may chance to open the book at this page, the study of bee-culture, and the propriety of adding this kind of farm-stock to the larger animals already owned. It is placed here for that purpose. It is to attract attention to the subject, and induce readers to turn over a few pages and read just enough to whet the appetite for more knowledge. It is instructive, as it shows the different form and size of the three classes of bees, so that any one, after studying this picture, need make no mistake. It shows how a swarm issues from a hive and settles upon a limb of a neighboring tree, and how fearlessly the bee-keeper approaches the swarm and puts it in the hive, which he will cover up and carry to its place on the stand. The author has frequently climbed to the top of a tree as high as this appears, and sawed off the limb upon which the swarm had alighted, and brought it down a long ladder to the hive, with no protection to face or hands. This picture, therefore, is intended to induce you to keep bees, and as a hint that you can easily learn all the art of bee-keeping.



THE APIARY. THE BEE-KEEPER AT HIS WORK.

CHAPTER II.

SMALL ANIMALS AND INSECTS.

SECTION X.—BEES, AND THE PROFITABLE PRODUCTION OF HONEY.

OUR opening chapter was devoted to a general survey of farm-stock. This will be devoted to observations upon bees, birds, bugs, insects, and worms; dogs, cats, rabbits, rats, mice, moles; camels as beasts of burden; goats of Cashmere, their value as farm-stock; fish-breeding, for domestic use or market; animals yielding fur, and alpacas, and other small stock of the farm.

In the leading article of this chapter we shall notice what may very appropriately be ranked as profitable stock upon a farm, for the product of the hive often affords a considerable income, and it is nearly all clear profit. Birds, although they do not produce a direct income, are among the greatest helps to that end, for they are great destroyers of those pests, the bugs, insects, and worms, which we shall also introduce into this chapter. Dogs, as an adjunct of the farm, and when only kept in very limited numbers, are not, perhaps, unprofitable stock; but as they at present exist, they are pests of the very worst kinds. Cats are a necessity, for without them we should be over-run with rats and mice, and so we give each a small space in this chapter. Rabbits, too, though small, must have a place; and camels, though large enough to fill a chapter, like the rabbit, must be contented with a paragraph. And the Cashmere goat, the only one of any value to farmers, is as yet so little diffused among them, that we can only afford space to give it a passing notice; and the alpaca, an equally important domestic animal, we must treat in the same short-hand way.

Fish-breeding is of vast importance to every farmer who has the facility for making a fish-pond, and therefore we have added it to this second chapter of animals, domestic or wild, upon the farm. And finally, we add fur animals, merely to call the attention of those who own suitable locations, to the fact that it is possible that such animals may be bred for their skins, to say nothing of the value of their flesh.

So much by way of introduction. Now let us take up our subjects, item by item, each under its appropriate head.

212. **Bees.—History of their Introduction.**—It is not quite certain whether the honey-bee is indigenous to America or not. Our opinion is that it is,

because several varieties now exist upon the continent, and certainly those in Central America appear to be natives, so far as it is possible to trace their history. It is possible that the early immigrants, not finding bees in the districts first occupied by them, either in New England or Virginia, did import them, though this supposition appears doubtful when we consider the length of voyages in that age of ocean navigation. And it is still further against the theory of importation, to know that as early as 1648—forty years only after Captain John Smith's advent—George Pelton, of Virginia, was in possession of a good stock of honey-bees; and they were noticed by Beverly as a common thing among the Virginia planters previous to 1720.

In 1755, beeswax was an article of export from Savannah, Georgia. It is impossible to state the quantity, because it is combined with myrtle-berry wax, and both are set down at 969 lbs. Five years later the quantity of both is given at 3,910 lbs., and in 1770 at 4,058 lbs.

In 1767, the export tables show 35 barrels of beeswax, sent from the port of Philadelphia; and only four years later the quantity is given as 29,261 lbs.

The history of Cuba credits Florida with bees imported from there in 1764.

The above facts prove that if there were no honey-bees in this part of the continent when our forefathers came to it, their importations were very successful, and the original stock was widely disseminated, and multiplied with great rapidity, for the census of 1850 gives the annual product of honey and wax at 14,853,790 lbs; and that at a time when the bee-moth epidemic had greatly lessened the stock in the country, and consequently the production was not as great as it had been.

It is a fact, too, that the immigrants of the Northwestern Territory found wild bees scattered all through the forests of what is now Ohio, Indiana, and Illinois.

As an offset to this, it is a fact that the first American settlers of California found no honey-bees in that State, notwithstanding the fact of its early occupancy by the Spanish; and the first bees ever seen in that State have been carried there from New York, by sea, since 1850, and already the stock of bees has multiplied to an extent which would populate the State to as great or greater extent than the Atlantic States have been with both wild and domestic stocks, in a far less time than has elapsed since the landing at Jamestown or Plymouth rock, of those who may have introduced the bee from Europe.

Bee-culture in California has already assumed such an importance that associations of apiarists have been formed there, and the exhibition of bees is quite a feature at the State fair. Bees have become so numerous in the neighborhood of Sacramento, that they have been charged with extensive depredations upon the vineyards, by sucking the sweets out of the ripe grapes. Mr. Harbison, a large bee-keeper, who went from Pennsylvania with a large shipment of them, two or three years ago, however, denies the charge of bees injuring the fruit, and asserts that he has proved by actual experiment that they will only attack the grapes after the skin has burst by the pressure of the interior growth. Still, there are many persons who are deeply interested in grape-growing in that State, who think this business and bee-keeping never can flourish together. It is a matter that will probably be investigated, since it involves two so great interests, particularly in California, where both branches flourish in so remarkable a degree of healthiness. Certainly, in no part of the United States has bee-keeping given such a promise of success.

Bees, although they appear to thrive best, or at least with but little care, in warm latitudes, are not confined to those regions. An article now before us gives an account of the successful introduction of bees into Aroostook County, Maine, where the thermometer sometimes freezes, and afterward the discovery of a wild swarm in a hollow tree, which was removed to a hive and wintered in a dark, dry cellar, where they consumed very little honey. This is a very good way to winter bees in all cold regions; for one of the greatest difficulties attending bee-culture in the most northern localities where they are found, is winter killing, not by freezing up in the hive, though that sometimes occurs, but by the bees being aroused from their torpid state by a few sunny days, till they come out of the hive and are overcome by cold before they can return again, and thus perish. We have sometimes lost great quantities in this way, no farther north than lat. 41°.

Notwithstanding bees appear to possess a considerable degree of reason, and the power of ratiocination (a power that many men do not possess), they are, like men and women, very apt to be caught by outside appearances, and venture forth from their warm homes upon sunny wings, to meet the chilling blast of the outside world, and perish.

Certainly, many acts of the honey-bee seem to be results of a reasoning faculty; or is it that undefined something that mankind call instinct? It is indeed wonderful that so tiny an insect should possess a faculty scarcely possessed by man, of constructing its domicile, or rather store-house, so as not to waste an iota of material or space; for that is a fact, in relation to the honey-bee's comb. And all their interior household arrangements, the order of their work, family government, and perfect order and harmony, are such as should make mankind blush at their own inefficiency. Many of them should blush to think such an insect is so much more industrious and frugal than themselves, and so much more careful to lay up winter stores.

One of the marks of reason, judgment, or instinct in the bee is manifested in their never leaving the hive, although ready to swarm, in a stormy day, nor when a storm or very high wind is approaching, which would be likely to blow away one portion of the swarm from the other.

When the swarm does come forth it seems to be all by a given signal, and the movement is sudden and simultaneous, guided by the call of their queen. If by any accident or mistake the queen gets separated, or fails to cluster with the swarm, it is idle to try to hive them. They will not take a new abode without a queen. Is it reason that teaches them that they must return to the old hive, where they can make a new queen out of the young larvæ in the cells of the old brood-comb?

213. **Bee-Hives.**—The best hive is one with movable supports for each sheet of comb. Although hives of this kind may have been patented, the patent is not good for anything, nor should it bar any one from the use of such a hive, because the invention is not new. Bevan, an English writer upon bees, described such a hive many years ago, as in use by him, and recommended it to others. More than twenty years ago, I described a hive for movable frames to sustain the separate sheets of comb, in the *Albany Cultivator*, and although the plan might have been patentable, it was distinctly stated that it was not, nor would be patented, and any one who liked it was recommended to use it. The form of the hive there recommended was to hang the frames by hook-and-eye hinges to the back of the hive, so that all would swing like the leaves of a book standing on its end. The front, or cover to the edge of the leaves, being opened, by turning it around to the left hand, leaf after leaf could be swung around to the right, and a sheet of comb cut out of any one, or the frame could be lifted off its hinges and taken away, and a new one put in its place. We thought the plan a more convenient one than lifting the frames out at the top of the hive.

There is an objection to all movable frame hives, that they furnish harboring-places for moths. They also, on the other hand, afford facilities for searching after them, and removing any infested comb.

Bees are like any other wild insect or animal that has been domesticated. By good treatment they can be made very domestic, so that their keeper can handle them about as easily as any other pets.

The next best form of hive is a square box, made of planed boards one-and-a-half or full one-and-a-quarter inch stuff, well seasoned, and tongued, and grooved, and firmly nailed together, so as to be water-tight, and nearly air-tight, and well painted. A box fifteen inches deep, and twelve inches across each way, contains 2,160 cubic inches—ten in excess of a bushel. This is a good size and form for a hive. It will add much to the convenience of the hive to insert a pane of glass in the side opposite to the openings where the bees enter, which should be six three-eighth-inch holes, an inch above the bottom. The glass should have a tight-fitting shutter; and the bottom should be screwed on, or hinged and fastened with a hook so that it could be opened. If it is screwed on, make an opening two inches across in the center of the bottom board, with a close-fitting shutter that you can take out occasionally to allow the bees to sweep out their room. Open this only in the morning, and close it before night. There will then be no entrance for the moth except through the bee holes, and these the sentinels will guard. Bore four inch holes in the top, and fit corks in them. Have a cap fitted on top to cover four boxes, five or six inches square, made with one glass side. When the lower part is filled, which you can tell by observation at the glass in the back, or by weighing, then open the top holes, and put on the boxes, open side down, and shut the cap over them, and the bees will soon find that they have extra store-room, and go to work and fill it with new comb, and fresh honey, free of bee-bread or brood-comb. As soon as a box is full, take it off, and put an empty one in its place. A stock of fifty swarms in the spring will produce two thousand pounds of surplus honey, and increase to a hundred swarms in the autumn. Counting all labor bestowed in the care of a stock of bees, and all expense of hives, etc., and the cost of honey is estimated at only three to six cents a pound; varying with locations, and favorable or unfavorable seasons. But if it always costs ten cents a pound, the bee-keeper would find sale for it at a profit.

214. **Straw Hives.**—There are a few bee-keepers who still adhere to the opinion that straw hives are the best that can be used. We can not think so. Their greatest advantage is, that they maintain a more even temperature than board hives, and are inexpensive. They can be manufactured by the winter fireside, and packed away for future use in a small space, one within another. When wanted for use, a couple of cross-sticks must be put in to support the comb, as the hive is in the shape of an inverted bowl, and not as good to support comb as a straight-sided box. It is a good plan, however, to use the supports in all hives. They should be so arranged that they can be easily taken out, as it would greatly facilitate the removal of comb. If straw hives are used, they should be made to hold a bushel, of clean rye straw, tied very tightly together, so as to make the walls full an inch and a half thick, and smooth outside and in. Never use them after they get old, and never place them where they will get wet. If kept dry, the bees winter in straw hives better than board ones.

It has been recommended to make cases for board hives, to set over them in winter as protection from the changes in the weather. If this is done, the cases should be taken off as soon as possible in the spring to prevent moths making harbors in them.

215. **Patent Hives.**—We have never seen a patent for a bee-hive, nor "bee-palace," that we would give a dime for. They are no better than any handy man with tools can make himself. As to "bee-palaces," where bees are to live in community, the thing is preposterous. It is founded upon wrong principles.

Bee-houses, where collections of swarms in separate hives are to be kept, we have tried as well as the community system, and repudiate both.

Movable comb-hives may be made without buying a patent, by making a chest of the capacity to hold a bushel, besides the frames, or say 15 inches square inside, and make 10 frames of strips of boards an inch and a half wide, nailed together flatwise at the ends so as to form sashes that will set in the box and just fill it. Bore holes for the entrance of the bees, through the sides of the box and frames. The lid of the chest shuts tight, and may be locked. When you want to draw a frame, insert a common wood-screw or two to pull it out by. You can tell as soon as you lift it a little, whether it is full or not, and if not, try another.

We have tried several patent hives, and if choosing between any one of them and a "bee gum," would take the latter for all practical purposes; not that we would recommend farmers always to use hollow logs, though we certainly have seen some most successful bee-keeping where the swarms were kept only in that rough way.

216. **Where to Keep Hives.**—The location and mode of support are important matters in placing bee-hives. And here again, the most "rough and ready" way has always appeared to be the best. We have frequently seen the hives standing about here and there, without any regard to order; some directly on the ground, and some on a flat stone or board; notwithstanding such apparent disregard to all care, the bees were doing better than others where every attention was paid to them. We do not advocate quite so much negligence, but we do believe the best situation for hives is in an open field, set a rod or two apart, or, rather, suspended to stakes. An orchard, where the trees are somewhat scattering, and the grass short, or kept short by mowing or pasturage of some geese, turkeys, or sheep, is a good place for bee-hives, one under each tree. A hive may be fastened to a tree or post by two hooks and staples, care being taken to fix it so it will be firm, and not liable to be shaken by wind. It may also be fixed upon two stakes set in the ground just wide enough apart for the hive to slip in between them and rest upon a block nailed upon each side of the hive, notched on the lower edge so as to clasp the top of the stake to prevent slipping sidewise. Hives placed about in the open ground should have a board laid over the top, wide enough to give some shade to the hive. Lay this board on four pebbles, or four nails driven in to keep it half an inch or an inch from the top. This shade-board may be held in its place by a screw or nail, or a stone. The hive need not be placed more than six inches from the ground. A little strip, an inch wide, should be nailed on level with the entrance holes, for the bees to alight upon.

If hives are placed under a shady tree, they will need no other protection. If placed close together, a rough shed may be built over a row of hives, so placed that it will shade them from nine till four o'clock in the day. A hive should be painted white, because that color does not absorb the rays of heat as much as a dark color. Sometimes a hive becomes heated so as to soften the cement, and let the comb fall to the bottom.

217. **Swarming.**—The location of bee-hives should be convenient to low bushes, such as lilacs, altheas, or small peach or plum trees, for them to light upon when swarming. We have heard of clustering bees upon a large woolen stocking, stretched over the end of a pole, and held up in the midst of the swarm as they collected after leaving the hive. When all have been gathered in the cluster, it is gently laid upon the table and the pole withdrawn, and a hive set over the bees. After they go up into the hive, the stocking is taken away.

Swarming is just as natural for bees as calving for cows. It increases the stock. The process can not be interfered with advantageously, either to retard or increase the operation.

The owner of bees should make them as well acquainted with his person as his horse or dog is, and then he can handle them as easily.

It is true there are some persons with whom the bees never will become friendly, or allow of any familiarity. Such persons should never try to handle bees. Others (the writer is one) can handle them with impunity. I have often had them light upon my face, and head, and hands, and remain as long as they liked, and then go away again.

When a swarm comes out, go immediately right into the midst of it, and do not be alarmed if it should cluster upon your hat. Such things have been, and no harm come of it. You must show no excitement; be moderate and calm in your movements, as if surrounded by a flock of wild birds which you were afraid of scaring away. An excitable man will be very apt to alarm the bees, and an angry one will be sure to make them angry and drive him from the field.

It sometimes happens that bees leave the hive pre-determined to fly away. In such cases it is difficult to stop them. If it is a dusty time, and they are gathering for flight so low that you can throw handful after handful of dust among them, you may succeed in confusing them until they will alight. Swarms have been stopped on the wing by firing a musket directly forward of them, so that both noise and smoke would confuse them. It is idle to fire after them, and shot sent into the swarm may kill the queen; when the bees must be returned to the hive, or put into one with a piece of brood-comb.

Some people make a great noise, beating drums, tin kettles, barrels, or blowing horns, when a swarm comes out. The philosophy of this is, that the noise may drown the voice of the queen, and thus confuse the bees, when they may alight; but, as a general thing, noise will have no more effect toward stopping runaway bees than runaway horses.

The very best thing that we can recommend to a new bee-keeper is: Be gentle, and keep yourself on familiar terms with your bees. Make them familiar with your presence and personal appearance, and always go among them, as near as possible, in the same garb; and never in a filthy garb, right from the manure-yard, perhaps; and never in your shirt-sleeves, reeking with perspiration. There is nothing more offensive to bees; for they are as neat as they are industrious, and never sweat anything out of their little bodies but clean white wax, of which they build their cells.

Thoroughly domesticated bees seldom offer to fly away when they swarm, if you have conveniences for them to cluster; and such bees are always easily handled, so that they can be hived without difficulty, even by the *gudewife* or children, if *the gudeman is awa'*.

If you are afraid of stings, put on gloves and tie your sleeves down; tuck your pants in your boot-tops; put on a broad-brimmed hat, with a piece of mosquito-netting over it, tucked in close around your neck, and thus protected, the most timid may go among his own, or strange bees, which always are the most dangerous.

If you happen to go near bees, and one comes at you, do not fight, run, nor scream. Walk away gently, and aim to get behind a bush, tree, fence, or building.

Place your hive in the place where it is to stand, as soon as possible after the swarm is in; because the workers commence comb-building immediately, and moving disturbs them, and if only a day or two at work, moving may break down the comb.

218. **What a Swarm Consists of.**—A swarm of bees in working order consists of one queen, two or three hundred drones, and from ten to fifty thousand workers. The queen would more properly be called a mother, as she is so, in fact, of all the colony. The drones are the males; they never work nor fight—they are stingless. The workers are imperfectly developed females. According to T. B. Miner, author of a bee manual, the swarm in the spring consists of the queen and about two or three thousand workers, and these increase as soon as food can be provided in spring, enough to make a new swarm, which goes off, led by the old queen, while a new one is provided for the old colony, which also goes off sometimes, with another swarm; and occasionally a third one is sent off, and finally, the swarm remaining consists of about 20,000 bees, and all but two or three thousand die off before spring; the life of a bee being calculated at only about nine months.

A queen-bee is so distinguished from other bees by her shape, size, and color, that when you have once learned how, you can always distinguish her. So you can by the noise she makes. A queen is larger than a worker, but not as large around as a drone, though longer; and the rings of her abdomen are less fully developed, and consequently not so plainly distinguishable. In short, a queen is more wasp-like in her form than a drone; and is of a darker color, particularly upon the back part of the abdomen; while on its under side it is of a yellowish hue. The wings of the queen, in proportion to her body, as compared to either of the others, are wider, stouter, and shorter. She is seldom on the wing; only at swarming time, and when she cohabits with the males. It is supposed that she is always impregnated during her flight, and that impregnation in the fall, before the drones are destroyed, serves for the eggs she will lay in the spring. Those who have made observations upon them, declare that a queen-bee is capable of laying hundreds, perhaps thousands, of eggs a day.

Drones are idle fellows; their only service being attendance upon the queen. Their life is a very short one; generally from April to August; say four months. None are allowed to live over winter. You must not mistake the slaughter of the drones for war with other bees, which sometimes occurs.

The workers are always busy whenever it is possible for them to carry on their labors. They often begin the very hour they enter a new hive to build comb, and the second day the honey and pollen gatherers begin to bring in their stores. To work to advantage they must have a good house. Sometimes when a swarm goes into a hollow tree, the labor is immense, to clear out and fit the room for use. So it is when put into a mean, dirty hive. It requires a great deal of labor sometimes for the bees to stop up the cracks of an old hive with bee-glue—a substance gathered in the forest, and not made by the bees. It is harder and stiffer when dry than wax, and entirely unlike it.

219. **Weight of a Swarm.**—It is estimated that a full swarm of bees should weigh 11 to 12 lbs. Hence all excess over that is honey and comb, so that the quantity can be ascertained by weighing the hive, if the weight of that is known, as it always should be, and marked upon it when new.

Hives should always be constructed with some conveniences for weighing, such as a staple in the top, if that is a fixed one, or one in each side, and then have a movable bail to hook in, to attach to the hook of the weighing balance.

220. **Bee-Pasture and Bee-Feeding.**—It has been a question for a long time, whether a country could be overstocked with bees so that their pasturage would be short. In a conversation with Mr. Quinby, one of the greatest apiarists in the country, we learned his opinion was that it was next to impossible to overstock any section with bees. We find from the "Bee Journal," published in Germany, that the same opinion prevails there. Mr. Dzierzon, president of a convention of apiarists at Munich, says:

"I have numerous accounts of apiaries, in close proximity, of from 200 to 300 hives each. Ehrenfels had 1,000 in three separate establishments, but so close that he could visit all in half an hour's ride. In Russia and Hungary, apiaries numbering from 2,000 to 5,000 are not unfrequent; and we know that as many as 4,000 colonies are often congregated together on the heaths of Germany. Hence I think that we need not fear that any district of this country, so distinguished for abundant natural vegetation and diversified culture, will very speedily become overstocked, particularly after the importance of having stocks populous early in the spring comes to be understood and appreciated. Mr. Kaden, one of the oldest contributors to the 'Bee Journal,' says that a district of country can not be overstocked with bees, and that however numerous the colonies, all can procure sufficient sustenance, if the surrounding country contain honey-yielding plants in the usual degree; where utter barrenness prevails, the case is different, of course, as well as rare.

"According to statistical tables, there are 600,000 colonies in the province of Lunenburg, or 141 to the square mile. The number of square miles in this country stocked even to this extent are, I suspect, 'few and far between.'

"A German writer alleges that the bees of Lunenburg pay all their taxes, and leave a surplus besides. The importance attached to bee-culture accounts in part for the fact, that the people of this district (so barren that it has been called the 'Arabia of Germany') are almost without an exception in easy circumstances.

"In the province of Attica, Greece, containing 45 square miles, 20,000 colonies are kept, or one colony to each inhabitant, producing annually 30 lbs. of honey and two of wax each. East Friesland (Holland), containing 1,200 square miles, has an average of 2,000 colonies to the square mile. In

1857, the yield of honey and wax, in the Empire of Austria, was estimated to be worth over seven millions of dollars ! !"

Could not still more favorable results be obtained in this country, under a rational system of management availing itself of the aid of science, art, and skill ? The island of Corsica produces about 800 lbs. of honey to the square mile, per annum.

There is no probability that any section of this country will reach such a state of productiveness in this generation. Yet we hope all who read these extracts will think what an immense loss is sustained annually by our neglect to employ harvesters to gather the great crop of sweets that might be saved if our bee population were large enough to gather it all.

Upon the subject of bee-pasturage, and those plants from which bees draw their stores of honey, we find some useful hints in Harbison's work on Bees and Bee-keeping. He says:

"The best kinds of early pasturage are the alders, hazel, and willows, some of which yield honey and others pollen ; most species of flowers yield both. My observations lead me to believe that the male flower yields pollen, and the female honey ; I have frequently seen bees gathering both honey and pollen from the same kind of flowers at the same time. It can be tested by examining both the honey-sack and the baskets on the thigh. These trees are the first to afford the bees provision in the spring ; where these abound, the bees advance earlier than elsewhere. The soft maple (*acer rubrum*) yields a considerable quantity of honey very early, if the weather is fine ; the golden or yellow willow also yields supplies quite early ; peach, cherry, and pear trees put forth early ; gooseberries, currants, strawberries, etc., all afford rich supplies. To close this list of early flowers, the dandelion and apple come forth in rich profusion, all of which are of the utmost importance for the prosperity of the bees during the season. If this early pasturage fails, or if the weather should be so unfavorable as to prevent the bees from gathering a supply of provisions, they will fail to rear a sufficient quantity of brood to swarm early or to harvest the clover honey to advantage.

"It is but seldom, if ever, that a sufficient quantity of honey is gathered from these early flowers to cause the bees to store it in surplus boxes, yet enough is frequently obtained to fill up a large portion of the combs from which the honey has been consumed during the winter, and serves to supply their immediate wants until clover blooms.

"The next pasturage comes from turnips, cabbage, and the hard maple (*acer saccharinum*), which yield a considerable quantity of honey, but later than the soft maple. Turnips produce a very copious supply of both honey and pollen, and if left standing in the ground over winter, they bloom just at a time to fill the interval between the fruit-tree flowers and the clover. This is also the case with the cabbage family, all of which yield large quantities of honey. A field of either turnips or cabbage at this early season is of greater value to the bees than the same quantity of either clover or buckwheat.

"I would here impress upon the minds of all bee-keepers the importance of cultivating a field in turnips each year. In the fall gather in all the large, fine ones, either for marketing or for feeding sheep and cattle during the winter, for which they are very valuable, and will well repay the expense of raising them; enough small ones will be left standing in the ground over winter to make a rich field of pasturage for the bees in the spring, leaving the ground in fine condition for a crop of buckwheat, or to sow down in wheat in autumn, or to again put down in turnips.

"The various kinds of blackberries, and the wild or bird cherry (*cerasus serotina*), yield honey, and serve to supply to some extent the interval above referred to. We have also a species of kale, or wild turnip, which if sowed very early in the spring will commence to bloom toward the latter part of May, and is very valuable.

"Raspberries of all kinds yield an immense amount of honey, and continue blooming, giving a succession of fresh flowers, for about three weeks. But few if any flowers produce such quantities of honey as the raspberry, in proportion to the number of flowers.

"Catnip, mother-wort, hoarhound, honey-suckles, and various other kinds of flowers, put forth about the same time; each would be of great value, if in sufficient quantities.

"Then come other early summer flowers. At the head of this list pre-eminently stands white clover (*trifolium repens*), which is found along the road-sides, in meadows, grain-fields, gardens, pasture-fields, in fact, it may be seen everywhere. The seeds, which are very abundant and very small, are driven in every direction by the winds; this has been overlooked by previous writers. The heads, which contain the seed, are quite small and very light; the stalks stand erect until winter sets in and the ground is frozen, by which time the stalk of it has become brittle, and every wind breaks off and rolls along the ground a portion of these little seed-pods, until they meet some obstruction; here they will germinate. Thus they are scattered in every direction. I have frequently seen them driven furiously on the crust of a shallow snow, through which the heads would project. The value of this clover is entirely underrated as a pasture for cattle or horses, as well as bees; it is always selected by stock in preference to the red clover. The honey gathered from it is of the highest excellence, both in beauty and flavor; and I believe in good seasons, all the bees, in any neighborhood where it abounds, could not gather the fourth part, so great is the quantity produced.

"The tulip-tree (*liriodendron*), or poplar, as it is called by some, by others white wood, is a great producer of honey. Nothing of the tree kind that I have ever seen exceeds it; the flowers expand in succession, are of a bell-like shape, mouth upward. In dry, warm weather I have seen a teaspoonful of pure honey or saccharine matter in a single cup or flower. Bees work upon it with the same vigor they manifest when carrying honey from some other hive, or when it is fed to them.

"The yellow and black locust trees yield large quantities of honey.

"The linden, or bass-wood (*tilia Americana*), produces honey to a large amount. All of these varieties of trees should be extensively cultivated, both as shade and ornamental trees, as well as for their timber and the vast quantities of honey they yield. Sumach also produces honey bountifully; the difficulty, however, is, that there are but few places where these are found in sufficient quantities to be of importance. I trust they will be extensively cultivated.

"The common black mustard is one of the most valuable plants to cultivate as a pasture for bees; it is easily raised, by simply sowing it on ground when well plowed and pulverized by harrowing smooth, and then brushing it in with a light brush or very light harrow. It should be sown early in the spring, on good ground.

"Those interested in bee-keeping should give the cultivation of mustard some attention. As a bee-pasture it has few superiors, yielding both pollen and honey in great abundance; it begins to open its flowers when quite young and continues as the bush expands, until it becomes very large; each day brings forth new blossoms. A field of mustard in full bloom is a most magnificent sight; it is like a vast pile of golden flowers; the plants are completely enveloped with flowers, from the ground up as high as a man's head. There is no other plant that I ever noticed that produces so many flowers to any given quantity of ground, nor yields so much honey.

"In almost any of the Atlantic States it serves to fill the interval that occurs between the closing of the white clover and the opening of the buckwheat flowers, a period of about four weeks, which is the very best part of the year for gathering honey, as the weather is generally warm and calm; hence the propriety of raising this crop to employ the bees profitably.

"The honey produced from it resembles that yielded from the linden, both in color and taste.

"Mignonette, a modest, unpresuming little flower, found in all well-assorted collections, is one of the greatest value as a bee-pasture, if grown in sufficient quantities to be an object. It is low growing and spreading in its habits, similar to white clover, and yields both honey and pollen; it will bloom continually, from the middle of June until killed by frosts in the fall. It is easily raised in large quantities if the ground is clear of weed seed, plowed, and well pulverized by harrowing before sowing. Sow thinly and brush it in with a light brush; all that is required after this is to pull out any large-growing weeds that may chance to make their appearance before the mignonette spreads over the ground; where it takes possession of the ground, it needs no further care. A bed of these flowers will perfume the air for quite a distance around, so rich is it. Bees will work on it from daylight until dark; two or three may be seen at once on a single head or flower.

"The *cephalanthus Canadensis*, or butter-bush, which grows in swamps, and low, wet, marshy grounds in almost every part of the United States, preserving the same appearance wherever found, produces honey of the highest excellence. The honey gathered from this shrub is of a very light straw color, of a thick, heavy body, and very excellent flavor. Bees thrive and store honey very rapidly when they have access to large quantities of these flowers. The time of blooming varies with different localities, but it generally begins to put forth flowers about the first of July, and continues for three or four weeks.

"In all places where buckwheat is raised, it becomes an important accession to bee-pasturage. A field of buckwheat yields an incredible quantity of honey, which perfumes the air for a considerable distance around. When the weather is favorable, the bees store honey from it very rapidly, faster at times than they can build combs to receive it. I have seen them fill pieces of old combs laid close to the entrance of the hive, with honey, and have known colonies to fill four boxes of honey, or about 50 lbs., during the continuance of buckwheat. This is by no means an uncommon occurrence, and goes to show that this honey harvest is one of great importance to the bee-keeper. Buckwheat may be sown about a month earlier than usual, to furnish pasturage to come in about the close of clover, to great advantage."

In relation to artificial feeding there are many opinions. There is probably no better food for bees than brown sugar, moistened with honey, such as can be bought at a low price by the barrel or gallon in any town. Add just enough honey to the sugar to make it into a dough by kneading. Put this feed in a shallow tray, with a few straws on top, and let the bees take their own way and time with it. It is well to give a little salt to bees, if they can not get it conveniently. The best way is to place a lump of rock-salt near the hives, and there let it remain year after year.

A practical bee-keeper says: "If the season has been unpropitious, the hives should be carefully looked after. If any contain less than 20 lbs. of honey, the swarm will need to be fed either with honey alone or mixed with sugar diluted to the consistence of honey, poured on to pieces of empty comb, and placed in the hive in such a manner that bees from other hives will not find it. Perhaps the best method is to introduce the feed into the boxes directly over the bees; but should it be a common box hive, it may be placed on the top of the hive, where there is a communication through the top, and placing a cap over the whole; and then gently rapping on the top of the hive, the bees will press up through and find the feed. The feeding should be done during warm weather."

221. **New Food for Bees.**—The fact has been discovered in France, that bees will feed upon the oil-cake (soaked in water) that is made in the manufacture of oil from the *Sesamum Orientale*, known here as the bene plant, so that they can be much easier wintered; and it is said the increase of stocks is wonderful in comparison with those not thus fed.

The *Flore des Serres*, from which we borrow this, assures us that the results have been astonishing, not only in a large increase of honey-comb, but in enabling the bees to multiply beyond all belief; nearly ten times the quantity being bred in consequence of the facility afforded of obtaining abundant and, as it would seem, excellent nourishment from this unexpected source.

The experiment could be tried in this country by apiarians planting the bene seed, and bruising and soaking the seed of the crop, and feeding it to the swarms after the natural food fails.

One of the greatest troubles in bee-keeping appears to be the want of suitable food early in the spring to enable the swarm to prepare for a new colony that may go out early enough in the season to lay up, not only their own stores for winter, but a surplus for their owner. Many swarms that have an abundance of honey for their own use and to spare in the spring, are inactive for weeks after the spring has become warm enough for them to work, because they have nothing to work upon. The first business is not to gather honey, but pollen, to make bread for the young bees. So, although the weather is warm enough, and the bees lively enough, until the buds afford pollen, they have nothing to work upon to enable them to be in season with the new brood, to produce early swarms. This is a serious drawback in late seasons, and in situations where pollen-producing plants are not plenty.

Mr. E. T. Sturtevant, of Cleveland, Ohio, claims that he has discovered a remedy for this difficulty, and that he can bring forward his bees some two months earlier, and get good swarms the first of May. His plan is to feed his bees with unbolted rye-meal, strewn upon boards convenient to the hive, the bees pitching into it at once and working diligently, and in such an earnest way as fairly to scramble over one another. It is a hint worthy the attention of all bee-keepers.

A few years ago, a bee-keeper in Wurtemberg discovered that bees extracted food from carrots which had been rasped and cooked for stock, and thereupon he boiled some to a jelly and placed it near the hives, at a time when the fields afforded no food, and he found that they worked upon it as though the saccharum it contained was particularly agreeable.

We suggest an experiment with carrots cooked in this way, by bee-keepers in this country. We would also try parsneps; and, where they are grown abundantly, sweet potatoes. And since we know that bees are so fond of sweet apples in summer, why not keep them to feed swarms when needing artificial feeding in winter. It may add as much to the health of bees to feed green food, as it does to health of other farm-stock. Let the experiment be tried.

222. **Ventilation of Hives.**—A great deal has been said about the necessity, on account of ventilation, of making hives open at the bottom. In reply to this, let men think that bees in a wild state prosper well in the hollow of a tree where there is but one small hole for entrance of the bees or ventilation, and that open-end hives, standing on a bench, are often cemented fast to it, and sometimes holes left, for ventilation, are sealed up as closely as though air was poison to the inmates of the hive.

If you wish to ventilate, bore a two-inch hole into the upper part of the large box, and cover it on the inside of the box and on the outside of the case with wire gauze, fine enough to keep out ants and other insects, for a ventilator. Bore inch holes through into both of the upper boxes, and cover in the same way.

Mr. Quinby says that he regards *proper* ventilation as very important, and yet *proper* ventilation is very imperfectly understood. He also says: "Any way to get rid of the moisture." The presumption is, that he would not freeze the bees at the outset as one of the ways, for that would surely prevent moisture; and if the *modus operandi* of some who give directions how to ventilate should be put in practice in very cold situations, the bees are just as surely frozen.

Moisture accumulating on the inside walls of the hive has caused the destruction of more strong colonies of bees than any one other casualty, except the fatal way of some bee-keepers to get *rid* of the *moisture* by opening wide the apertures in the top and also in the bottom of the hive, and thus causing a current of external air to pass up through the interior—precisely the method to cool a hive in hot weather—and also thus rendering the bees more exposed and liable to be frozen than they would be situated on the exterior of the hive. *Proper* ventilation is simply to give free vent for the air at the top of the hive, and not admitting any or but very little air through the bottom. Under all circumstances it is requisite to regulate the openings in the bottom with those in the top, which amounts to about the same thing without the drawbacks of inverting the hive.

There is a new form of bee-hives, used by J. L. Scribner, of Montpelier, Vt., a successful producer of honey, so much so that he carries off all prizes at the county fair.

This hive, being made of straw, serves admirably for ventilation. It is made of a frame of square sticks, say one inch diameter, and in capacity 12 by 13 inches, and 13 inches in hight, with a flat board roof projecting two inches each way. The frame is nailed together; the lower girts are placed ¼ inch above the bottom of the posts. The frame is covered with straw sewed together, just as it is in straw hives, with a hoop at the bottom, made of strips of boards one inch thick and two inches wide nailed together. In this hoop a notch 2½ inches long, ⅓ inch deep, is cut for the bees. Plane all the wood, and use none but clean rye straw. On the roof, over suitable holes, the boxes for storing honey are placed. It is thus described by Mr. Scribner:

"The advantages of this hive over all others that I have used are very material in my view. It is generally conceded that straw hives are the best to winter bees in; not altogether because they are so much warmer, but because they will '*keep dry*,' and the frost does not accumulate as in board hives. Every experienced apiarian knows that in wooden hives there is a continual dampness, arising in part from the breath and effluvia of the bees. Not so in straw hives. Straw being of a dry and absorbing nature, the moisture is taken up. Now, I have learned that straw hives are as much better in summer as in winter, especially in the season of breeding, when we are subject to frequent and sudden changes of the weather, such as damp, chilly nights and hot days. The temperature of a straw hive is more even:

it does not heat *excessively* in hot weather nor cool suddenly, as do board hives. The *natural* warmth of the bees is retained, which is particularly conducive to their health and prosperity. Hence there should be *no unnecessary* ventilation by leaving an 'open space,' as has been recommended by some, 'all around the bottom of the hive.' Especially in damp, chilly weather, bees will breed faster and gather more honey in straw hives than in board hives, according to *my* experience. One reason for their gathering more honey, probably, is because the young brood comes to maturity faster, consequently there are more 'laborers in the field' in the early honey season. This hive combines all the *real* advantages of every patent hive that has come to my knowledge, while it obviates all the objections and retains all the good qualities of 'the old-fashioned straw hives.'

"The less a farmer bothers himself with patent hives and bee-palaces, and the less he tries to counteract nature, the better he will be off. I am heartily sick of 'patent bee-hives,' and it is time to abandon them."

223. **Taking Honey, and How to Keep the Bees from Stinging.**—When bees are alarmed for the safety of their stores, they immediately rush to the cells and fill their sacks with honey, apparently to provide against any contingency that might arise. When in this condition, they are perfectly harmless, never volunteer an attack; consequently, to tame bees, or render them docile and easily driven or handled, simply take advantage of this peculiar instinct. To confine them closely to their hive, rap repeatedly on its sides for a few minutes; this alarms them, and they will gorge themselves with honey, when they can be handled and controlled at pleasure. But we have adopted the following plan, which we find best adapted to our use, and recommend it to others, with the assurance that it will give satisfaction: Take clean cotton or linen rags, such as are used in the manufacture of paper; make a nice roll of these, about an inch in diameter, and from six to twelve inches long; wrap this pretty tight, either with narrow strips or shreds torn from cloth, or, what is more convenient, use wrapping yarn of some kind; prepare a number of such rolls, and keep on hand in some box, or any dry place, near the apiary, together with some matches. When you wish to open a hive or perform any operation, set fire to one end of a roll of rags; it makes quite a smoke, without any blaze. Upon opening the hive, blow the smoke vigorously among the bees for a minute or two, which terrifies them, without doing any permanent injury; they immediately rush to the cells and fill their sacks with honey, when you can proceed to lift out one comb after another, and perform any operation with perfect impunity, without any fear of being stung, unless by those from other hives near at hand. Should there be some, however, that would show signs of battle, blow a little more smoke upon them, and repeat it from time to time until the close of the operation. Toward the close of the honey season, when they are rich and increased in stores, they are harder to control than at any other season of the year; when this occurs, put a small portion of tobacco or a few grains of sulphur in your roll of rags; this renders the smoke more pungent, and will easily subdue the

bees. Dried puff-ball makes a smoke that subdues bees without injury to them.

224. **Bee Moths, and How to Protect Bees from Them.**—Numerous patents have been taken out to sell bee-keepers, to keep the moths out of the hives. All of these contrivances fail in their object, or else have objections to them which have prevented their general introduction. One now before us consists of a set of swinging doors, just such as we have often seen at cat-holes, hung at the top so as to fall into place as soon as pussy gets through. For the bees, a small tin, about the size of a dime, is hung in the entrance hole, which the bee can push open, but the moth can not—that is, so says the patentee.

Where open-end hives stand upon a bench, we have seen moths prevented from injuring the swarm by raising the hive, during the moth season, about half an inch from the bench. The theory of this plan is, that the moth inserts her eggs between the bottom of the hive and bench, where they hatch, and the bees can not get at the worms; but if it is raised up, there is no opportunity for the moth to deposit her eggs where they will be safe.

A cheap, good moth-trap is made in the following manner: Take a piece of thin pine board, or a shingle, a few inches square, and with your pocket-knife cut three-cornered grooves on one side, and lay it, grooved side down, on the bench under the hive. The moths will find a secure place from the bees, and deposit their eggs, which you will find, or the worms, and destroy, by looking at your traps every few days.

Mr. Quinby recommends the following mixture as a moth-trap: Sugar or molasses and a little vinegar and water, making the "contrast" agreeable—the sweet and the sour. Put this in shallow dishes, saucers, or tin baking dishes, and set them among the bees at evening. Next morning, moths of all kinds will be found in the liquid, and may then be strained out and destroyed, and the mixture used the following evening.

225. **Introduction of Bees into California.**—The honey-bee is not a native of California. The credit of introducing them is due to a man by the name of Shelton, who, after doing much for the interest of agricultural improvements in that State, lost his life, while still a very young man, by the explosion of a steamboat boiler on the Sacramento River. He imported, in March, 1853, the first bees into California. He left New York with twelve stands, or hives, and arrived with but one; from this one about one hundred and fifty swarms were credited in 1858, and, of course, have largely multiplied since that time. There have also been very large exportations made by steamer from New York. The Messrs. Harbison, of Pennsylvania, have been very successful in shipping and selling swarms, and have also established an extensive apiary at Sacramento. The common price of some of the first stocks sent to or produced in California has been fifty to one hundred dollars a hive. The Harbisons made their first shipment, we believe, in 1858–9.

It has been thought singular that our people found no bees in California, when they were so abundant in Mexico and Central America. Since the introduction of bees from New York, a California paper states that several attempts to import bees from Mexico have failed. Captain Macondray had one or more Mexican swarms, but they soon dwindled away. In 1859, Mrs. Sutter, daughter-in-law to General Sutter, had forty-four hives packed on the backs of Indians to Acapulco, and brought on the steamer to San Francisco; two or three weeks after their arrival, there remained but two hives containing bees; they were taken to San José, but in a short time they also died.

It also says, and so does every one we have conversed with on the subject, that California is admirably adapted to the honey-bee, as the experience of five years fully demonstrates. In San José Valley, Sacramento Valley, Shasta, Bidwell's, Stockton, Columbia, and Napa they multiply rapidly and store abundance of honey. The willow affords the first material for pollen. The bees commence gathering it by the 1st of January; about the 15th of January it is in bloom, and affords considerable honey, though slightly bitter. The bees gather pollen and honey from the willow till March. The wild mustard affords an inexhaustible supply of honey from the 1st of April to the middle of June. Later in the season, honey is obtained from buckwheat and honey-dew.

Honey made from mustard blossom, from which most of the honey is gathered in San José Valley, is excellent, and has sold in San Francisco at from $1 25 to $1 50 per pound. New swarms issue as early as the 15th of April, and the swarming season continues to the 16th of June.

226. **Stingless Bees.**—There is a good deal said of late about going to Brazil after "stingless bees." What is the utility? We have a better sort here, and their stings are in no manner objectionable. In fact, they are advantageous to the apiarian. They guard the store from thieves of all sorts, and they are much better honey-makers than the South American variety, which has no sting, all of which are of a much smaller size than our common honey-bee, and some of them make honey that is sour, and others give it a bitter flavor. This may be owing to the flowers it is extracted from, as we have known bees here to make uneatable honey.

Wells, in his explorations of Honduras, gives the names of fourteen varieties of honey-bees. Honey is very abundant and low priced. He was charged but ten cents a quart for it. He says: "The bees are diminutive, and mostly stingless. Swarms of them may be seen every day, when traveling in the open country, hovering around some decayed tree, and but little trouble is necessary to bear the whole establishment to the nearest hacienda. One of the proprietors said he had sold enough, since owning the estate, to buy all the drilling, *mantos*, and articles of that description, required at the hacienda."

The most curious thing about most of these bees is that they do not store honey like our bees, in combs of hexagonal cells, but in little sacs, two inches long, arranged in rows along the sides of the hive. The cells for the young are placed in the center.

227. **Italian Bees.**—During the year 1860, a good deal has been said about the advantage to be derived from the introduction of Italian bees into the

United States, and importations have been made for that purpose. The plan is to breed queens, which, after being impregnated, are introduced into common hives, after removing the old queen.

A writer in the *Country Gentleman* newspaper gives the following as the history of the introduction of Italian bees into this country. He says:

"Mr. P. J. Mahan, of Philadelphia, is mentioned 'as being the first to land this new variety on our shores.' As a matter of history, I would state that this is not so. For several years past the attempt has been made yearly by Mr. Richard Colvin, of Baltimore, Samuel Wagoner, of York, Pa., and Rev. L. L. Langstroth. These attempts were unsuccessful, owing to bad packing and mismanagement in transportation, until the autumn of 1859, when Mr. Colvin received some Italian stocks, and hoped to have queens from them for sale the past season, but these stocks, unfortunately, did not survive the winter. Next in order of date is Mr. Mahan's importation from Germany, which was successful on account of his personal supervision. Shortly after Mr. Mahan's importation, Mr. S. B. Parsons, of Flushing, Long Island, succeeded in getting a few swarms alive from Italy. From them he has succeeded, aided by several skillful apiarians, in raising a large number of queens, which have been sent to nearly every State in the Union, including California, under the supervision of Mr. Bigelow, a successful apiarian.

"The last successful importation was by Messrs. Colvin and Wagoner. All the above named are exerting themselves to multiply their stocks of Italian bees, and they will doubtless have a demand for all the queens and stocks they can supply next season, as the interest in this new bee is deservedly increasing. The question will naturally arise, Of whom shall I purchase? Are these importations equally reliable, and if so, have all taken the same pains and been equally successful in keeping the breed pure? I would here remark that some situations are more favorable for maintaining purity than others. The Italian bees now in this country are from three different sources, and every one should decide for himself to which stock he should give the preference, and if the most reliable man and the most reliable bee can be found working together.

"Two of the importations are from Germany, and one from Italy. Of the importation from Italy there can be no reason to question its purity. The two importations from Germany are from different breeders. One of the importations from Germany I have the fullest confidence in from personal inspection; and if the other be equally good, we are in a fair position to have the country well supplied with pure stock in a few years, provided sufficient interest is taken to maintain purity."

228. **Reasons for Keeping Bees.**—In this section we have only aimed to say just enough to encourage every reader to keep bees, who has anything like fair facilities for them to obtain a supply of honey from gardens and fields, which they will do if within a mile, and some bee-keepers say if within two miles. But it is not profitable to allow bees to go so far, when the bee-keeper has land upon which he can grow bee-food just as well as he can grow food

for any other farm-stock. The fact that bees obtain a great deal of food from fruit-trees should encourage farmers to cultivate both together. And if he plants along the roadside long rows of willows, maples, lindens, poplars, he will not only have the advantage of them for shade and ornament, but his bees, if he has them—and if not, let him be encouraged to get them—will find a great field up in the branches, that they can use as pasture.

The strongest reason that can be given for keeping bees is this simple fact: They afford more clear profit than any other stock ever kept on the farm, and, generally speaking, the more labor is bestowed upon them in providing good hives and pasture, the better they pay.

SECTION XI.—BIRDS.

Reason and Religion in Preserving Birds.—We don't know how much we have written, said, and sung to induce farmers not to destroy the birds, nor allow them to be destroyed, because we look upon them as part and parcel of the farm-stock, and of more importance to the farmer than some animals he keeps, at much more expense than his stock of birds. We say his stock, because we consider the birds on the trees just as much the property of him who owns the trees as the trees themselves; and he who would steal one would steal the other. A man who would come upon my farm and shoot my birds, without my permission, is not one of the noblest works of God. No man who takes reason for a guide, who owns a farm in any of the old States, can consent to have his birds destroyed. He certainly will not destroy them himself, after he has taken time to think upon the subject. It is our object to induce him to think, and the best place to do so is to go out among them in a bright spring morning, and hear their music.

Go out among the trees in the orchard or through the grove, or look into the hedge-rows or peep under the old bridge down the lane, or go to the barn; go anywhere, everywhere, where you will, and at this season—that is, lovely May season—you will find the birds—busy, merry, singing birds; hard at work they are, too, building their houses—cradles, rather—and all the time keeping up a concert of sweet music. Various too are their tastes in selecting their sites for their nesting-places, some hiding away from man, some coming up to his very door, or, like the martin and swallow, under his roof and protection. Robin-red-breast almost invariably comes into the orchard, sometimes on the trees, sometimes on the fence, sometimes, where kindly treated, under the shed by the barn or house.

The woodpecker—the same one that was tapping "the hollow beech-tree"—makes holes in the old apple-trees, into which for years afterward the pretty bluebird creeps and rears its annual brood.

The blackbird, the most numerous of the family of small birds, mostly nests in the swamp; except one variety, imitating the crow, that goes into the highest trees, such as the spruce, with a dark, thick top, where boys nor small shot can not come.

In the meadow we find the sly nest of the quail and lark and several small birds; and in the thickest bushes, the home of the brown thrush. He is a natural musician, a sweet bird full of glee and cheerfulness; but the merriest and most amusing of the whole family is the noisy little bobolink.

We look upon birds as among the essentials of a landscape, and would as soon think of chopping down the orchard, shooting the turkeys, and wringing the necks off of the barn-yard fowls, or making mutton of the sheep or giving the lambs to the dogs, as to think of destroying the birds or driving them from the premises.

"Going a gunning," with the murderous intent to kill such birds, ought to consign a man to the infamy that we are apt to attach to a savage or a brute who wantonly kills the finest of God's creation.

Without birds, a country is desolate; with them, it is always cheerful. Their songs would enliven the heart of a stone, or make a miser for the moment forget his money.

The association of children with birds, when taught to love them and not destroy their nests, has as direct and certain a tendency to improve their natures as the church or family fireside. Teach a child that birds are among the good gifts of God to man, and it is hardly possible that the child will grow up to manhood without being possessed of some of the attributes of the sweet songsters of the grove.

And yet there are parents who allow their children to wage incessant war upon the birds, never thinking of the injury they are doing their young minds, or how many destructive enemies they are entailing upon the crops in the shape of countless caterpillars, grubs, and worms.

We do not know of a higher Christian duty for a minister to engage in than an effort to preserve the birds in his parish.

We would impress upon the mind of every child that the command, "thou shalt not kill," meant these dear little birds as well as things of a higher degree. Thou shalt not wantonly kill a single thing of all creation that is not necessary for man's sustenance, or that is not detrimental to his interest.

Children should be taught not only to love the music of birds, but to look upon them as models of beauty and affection to their mates and to their young. Instead of driving them away from the house, encourage them to come and perch upon the window-sill and build their nests under the eaves.

Do not tell us they destroy the small fruit. Plant enough for birds and men. If they do eat fruit, they also eat worms, and you can well afford to give them a few cherries and currants for what they have done for you.

Around the city there is a difficulty in preserving the birds, because all the groves are infested with an abominable nuisance in the shape of big boys and prowling loafers "out for a day's shooting."

They ought to be out for a day's shooting, and that should be at their own idle carcasses, with fine salt and pepper-corns, and every owner of land should be allowed by law thus to salt and pepper any of these idle vagabonds who come upon his grounds without leave to doom the birds to destruction.

Farmers! let your motto be—and impress it upon all your family—Never kill a bird!

In the early settlement of this country, there was such an abundance of birds that the people who were striving to raise grain enough for the support of their families, looked upon them as their enemies, because they were naturally disposed to come in for a share of the crop, and some of them, such as the crow and the large blackbird, sometimes depredated upon the seed, by which the crop was effectually cut off.

So a war of extermination was declared without discrimination against all birds, and it was carried to such a bitter end that the children of the first settlers grew up with a fixed opinion that they were doing a Christian duty whenever an opportunity offered, in destroying birds and birds' nests, and they entailed the same disposition upon their children and their children's children; and so the poor birds have been almost exterminated from the face of the earth with scarcely a thought why or wherefore, except that they were birds, and birds must be destroyed—"father says so." Upon that *ipse dixit* some of the best friends of the farmer, instead of his worst enemies, have been almost annihilated, while others have come to regard him as a being to be so avoided that they make their abodes in deep forests, and hide their nests and young from man as carefully as man would hide his young from a tiger.

Experience teacheth wisdom; and after two hundred years of teaching, the American farmer is just beginning to learn that birds are his best friends. He shot them upon his plum and cherry trees because they took a share of the fruit, and then came the insects that the birds used to prey upon, and the days of plum-growing were over. So of many other insects, real pests of the farmer, everywhere multiplying as the birds decrease.

Not one of the species upon which man has made such unceasing war, but has its use. Even the owl, although it will eat chickens, is a great mouse-destroyer; and the hated hawk is sometimes shot with a snake in its bill. Crows should be treated with as much care about a farm as domestic fowls. Do they pull up your sprouting corn seed? Feed them and they will not. Sow corn broadcast through the field and they will not touch that which you have planted. Birds of all descriptions should be taught that man is a friend and not an enemy, and they will return the friendship.

Some lover of birds—and he who is not such is "fit for treasons, stratagems, and spoils"—may demur to our assertion, that they are less influenced by gratitude than their four-footed fellows. If our assertion is incorrect, we shall be happy to be set right, but we believe that facts are against the birds; yet if this be so, the circumstance is not to their discredit. They are the humorists, the musicians, the conversationists of the animal world; so fully occupied in talking, singing, joking, eating, and rearing their families, that they have little time to devote to those immense beings, pantalooned or hooped, whom they undoubtedly regard from their airy hights with a sort of contempt, as they behold them slowly plodding along, confined to the dull earth and unable to take a flight even equal to that of one of their newly-fledged offspring; and if they condescend to pick up a few crumbs scattered by some gentle hand, they feel as little of the emotion of gratitude to their benefactor, as the squirrel to the chestnut-tree which rains upon him his winter's supply. A certain degree of brain development is necessary for the existence of this emotion, and birds, in this respect, are inferior to most of the quadrupeds with which we are familiar.

Birds do not seem to be as susceptible as quadrupeds to kind treatment, and those species which have been domesticated appear to have lost whatever "smartness" they may originally have possessed. The whole tribe of domestic fowls—cocks, hens, ducks, geese, guinea-fowls, turkeys, pea-fowls—are unmitigatedly stupid—acute in nothing but picking up corn and devastating gardens.

The *crow* is one of the birds that unthinking men destroy, because they pull up a little corn in the spring. Will you think what else he does?

He consumes in the year vast quantities of grubs, worms, and noxious vermin; he is a valuable scavenger, and clears the land of offensive masses of deceased animal substances; he hunts the grain fields, and pulls out and devours the underground caterpillars, whenever he perceives the signs of their operations, as evinced by the wilted stalks; he destroys mice, young rats, lizards, and small snakes; lastly, he is a volunteer sentinel about the farm, and drives the hawk from its inclosure, thus preventing greater mischief than that of which he himself is guilty. It is chiefly during seed-time and harvest that the depredations of the crow are committed; during the remainder of the year we witness only his services, which are so appreciated by those who have written of birds, that I can not name an ornithologist who does not plead in his behalf.

Frighten the crows, but do not kill them, except one to use to keep his fellows off your corn. Pick off part of his feathers and scatter them on some spot in the field easily seen, and near by lay the carcass of the dead crow and you will see his late companion sailing over the field and looking down upon what has been done, but very careful not to light where he too might fall a victim. If you can not kill a crow, you may make a very good show of a dead one with a black hen. Crows are too valuable as vermin-destroyers on a farm to be wantonly destroyed because they pull up a little corn.

A writer at Eaton, N. Y., sends us the following item in favor of the persecuted crow, which makes him out not quite so black as he looks—that is, when seen by the eyes of some of his enemies. He says:

"For the interest of the farming portion of this country, I communicate the following: Mr. Alpha Brown, an enterprising farmer of this town, informed me that, having acted this year upon the somewhat late suggestion of yours, of sowing corn broadcast over the planted ground, he experienced a new result. Upon four acres, where heretofore his crop had been greatly injured by the devastations of the "white grub" and "gray corn-worm," he sowed broadcast, after planting, a half bushel of corn. This, of course, attracted the crows, which, coming to the ground in the cooler part of the afternoon and morning, found the worms on their usual visit to the surface, and, preferring the latter to the corn, devoured them instead. The result is, that out of the whole field he has not lost to exceed five hills."

230. **The Reverse of the Crow Question.**—Having given our opinion in favor of the crow, in the preceding paragraph, we feel that it is due to a fair investigation of the question not to make it an arbitrary opinion, and rest there, but to give the opinions of others also. It is *facts*, not theories, that we wish to give farmers.

One who signs himself a "Farmer's Boy," writes from Ridgefield, Conn., about crows, as follows:

"Having lately read your article upon the subject of crows and others of the feathered tribe, I can not hold still my rusty old steel any longer. I agree with you very well until you advocate the protection of crows; there I think you miss your mark. There is but one thing you name that is in their favor—the digging of grubs. They are the enemies of all our small birds, which you advocate preserving. They commence with the eggs, and continue their depredations until the young are nearly grown. They are never found destroying insects of any kind that could not be of more use than the crow, and even the grub can be made a source of income to the farmer. An intelligent farmer told me, some years ago, he made 1,000 pounds of pork by letting his hogs feed on them in his meadows, which damaged his grass but little the first year, and thought it better the second by having the surface stirred. You speak of their devouring carrion. Now, in my opinion, no farmer that is a good economist will allow any dead animal to lie and rot in the sun to make food for the crows. I consider the carcass of a horse, a cow, or an ox worth from three to five dollars to any farmer. If so, it is quite too dear food for crows. Some say crows catch grasshoppers and crickets. I prefer a nice brood of turkeys, that will not look bad on the table when they have performed their work on the farm.

"You see I am a friend to almost everything but a crow. If there is anything made in vain, it is the crow. They destroy our little warblers; they catch our chickens, ducks, turkeys, and goslings; they dig our potatoes, pull our corn and beans, from the time they appear above ground until they grow out of their way. Then, as soon as the grain is formed on the ear; they commence their work again. Now, if such a pest as this is to be protected, it must be by some one who has a heart softer than I have; a creature that but one thing can be said in its favor, and the rest must go against it. I have not the least doubt but our town was taxed $500 last year to feed crows."

Upon this we simply remark: If "Farmer's Boy" has a breed of crows about him that really catch turkeys, goslings, etc., and dig potatoes, he is welcome to be their enemy. *Our* crows are of another sort. But is our "boy" *sure* that he "can tell a hawk from a hernshaw?" Because the raven, though one of the *corvus* family, is not a crow, as we understand the word; and it is just possible that the bird that catches turkeys and other birds is a raven.

We have another opinion, coming from a citizen of Montgomery County, Penn. He says:

"Leaving *your* crows under your protection, to enjoy their excellent reputations, we desire to say a word on the character of *ours*. That we have real, veritable crows that catch young chickens, is a 'fixed fact,' well established. The present season, notwithstanding our care, we lost by them, I suppose, from ten to fifteen, and avoided the loss of others only by the use of gunpowder. Our experience on this subject, I may add, is that of many others. This thing, then, our 'breed' of crows *do*, and also carry off spoiled eggs that may be thrown away, birds' eggs, etc. In reference to ducks and goslings, I am unable to speak, but have no reason to believe that they are distasteful, or that they do not catch them.

"They love, it appears, a variety. A near and reliable neighbor informs me that quite recently he saw one of our tribe in hot pursuit of a rabbit, which, after sundry dodgings, secreted itself under the fence. So you see New York crows differ from ours, and, I incline to think, from most other crows."

Here is another opinion. This comes from Theron Wales, Windham, Portage County, Ohio. He says, in relation to our remarks upon the statement of "Farmer's Boy:"

"I conclude you received it as doubtful. I can add testimony in part to the same effect. I have seen the crow alight into the nest of the robin and carry away the young birds to feed their own young. They are passionately fond of the eggs of other birds, and I have caught them in traps with egg-shells. Hunters of the wild turkey can testify to the hatred between the crow and the gobblers. From the frequent presence of the crow over the gobbling turkey, it appears they watch for their nests. At least every cry of the crow is answered defiantly by the turkey, and thus I have often been led to approach the turkey and shoot him. While we were living upon the Berkshire Hills, in Massachusetts, it was not unfrequent that our neighbors' and our own young lambs had their eyes picked out by the early returning crows in the spring. But I do not say these things for the sake of engaging in an exterminating war upon them. All things were created for some wise purpose. Every creature has in nature its enemy and destroyer, and every attempt on the part of man to give preponderance to one part of the wild creation over another, *will fail*. Civilization will of necessity drive away the beaver, otter, deer, and a host of forest birds, and their places will be rapidly supplied by the wren, the robin, the bluebird, the honey-bee, etc.

"The raven is more carnivorous than the crow. I once saw one alight into a kingbird's nest and carry away the young, in spite of the cries and efforts of the old ones."

The crowning charge against the crows comes from Freeport, Me., in a letter written by E. Pratt, Jr., who says:

"Now what '*your* crows' are, or what they eat, or how they get their living, I know not; but the crows in Maine both dig and eat potatoes, incredulous as it may appear.

"In some seasons I have known many acres, planted on light soils, in exposed situations, devastated by these miscreants, and that in my own neighborhood.

"Their manner is, when the plant first breaks ground, to dig and pull it up with the tubers attached, though it appears by the partially eaten ones left here and there on the field, that they do not eat them with much avidity.

"I know that popular writers think the crow a great blessing to farmers, but I am yet to be convinced of this, and can only wish that those who think their company so desirable should have the benefit of my share."

There is but little doubt in our mind that most of these bad birds were ravens, and not crows, particularly as Mr. Wales acknowledges the presence of the raven, and says that he is a carnivorous bird.

Now, having said our say, and allowed others to say theirs, about crows, we will drop down to wrens, by way of contrast.

231. **Wrens.**—We waked one morning—one of those May mornings—when our domicile was a city one, with delightful sounds coming in at the window. They were the notes of sweet singing birds. What lovely music! It was the first of the season that had come to our ears, and it struck a chord that called to mind scenes of youth, long, long ago. We hastened to the window and looked out. "Ha! ha! my old friends," we cried, "and so you have come back again." It was the wrens, the same ones undoubtedly that we built a nesting-place for last year. There was one pair then, now two pair—the progeny, we suppose, of those that sung for us last year. "And so," we said, "you have both come for a nesting-place, have you? Well, there is the old one—but you must have another. An increasing family needs more room. You shall have it." Notwithstanding the morning was a rainy one, we feared our pets might feel neglected, and so down we went to provide for their necessities. How amply were we repaid the little labor! for all the time we were engaged, they were hopping about the peach limbs, picking off the insects, and singing all the while most merrily. Who would not cultivate such society as this? Who would not like to have their trees protected from insects that destroy foliage and fruit? Every one, surely. Then protect the wrens. Build nesting-places for them, and they will come every spring and send their sweet notes into your open window, some pleas-

ant May morning, to waken you to see the beauty of sunrise, or lull you into dreams of the old farm-house, orchards, and singing birds.

A paper from Prof. Nash says he has domesticated the common wren in this city, by building them a suitable house, very much to the amusement and pleasure of the family. One pair hatched and reared ten young ones in one season, and they acted as perfect scavengers of bugs and worms in the neighborhood. Mr. Nash says two hundred wren-houses were built last year about Union Square, which were not only occupied by wrens, but several other kinds of birds, and these served to keep the park and neighborhood almost free of insects.

A writer in *Hovey's Magazine* recommended the use of wrens to drive other birds away from the cherry-trees. He says:

"I have seen the experiment of placing a wren-box on a cherry-tree, tried in several instances with apparent success. The best thing for this purpose is an olive jar. A hole should previously be drilled into the side of the jar, which should be fixed upon the tree, by thrusting the stump of an amputated branch, the more upright the better, into the mouth of the inverted jar, of just sufficient size to admit a wren, but too small to allow a bluebird to enter; since, if it were otherwise, the latter would be sure to get possession of it. The wren being a very jealous and pugnacious bird, is diligent in driving all birds from the tree in which his nest is built, and does not hesitate to attack birds as large as the robin. It is doubtful, however, whether the wren would persevere in his attacks, when the robins had become very numerous, but the expedient might be used with some advantage in all cases."

232. **Protecting Trees from Birds.**—Some persons advise throwing a net over the trees, during the few days while the fruit is becoming mature. This may be done in some cases, if there are but few trees to be protected, and the owner can afford to undertake a job that must be both troublesome and expensive. Such an expedient would be hardly advisable except in extraordinary cases. Some fix a little windmill in the tree; but as the wheel is constantly turning, the birds soon become accustomed to it, and cease to regard it with suspicion. If anything of this kind is to be used, it should be kept motionless, until the birds fly into the tree, and then put suddenly into action by some person who is watching it. Something like a watchman's rattle elevated on a pole, and fastened firmly to each of the trees, with a cord to be pulled when the machine is to be set in motion, might answer a good purpose. A boy might be hired in this case to watch the trees, and to pull upon the cords as the birds arrived. Cherries require so short a time to ripen, that no tree would need to be watched more than one week.

As birds always give the greatest offense, by their depredations upon fruit, to those who own but few trees, our argument is, that the best protection is to plant trees enough to serve you and the birds too, with all that all of you can eat. You would then not only have the satisfaction of having what cherries you wanted, but the pleasure of seeing the birds. From experience every season, we are satisfied that the robins save us more cherries than they eat. Our trees were infested with the same kind of yellowish bugs that ate the roses, and are commonly called rose-bugs. We have seen half a dozen of them eating upon a single cherry, attacking them before they were ripe, and before the birds did. When at length the robins came in goodly numbers, the bugs decreased, and if the robins ate cherries, they also ate bugs, and we believe more than they did cherries. At any rate we had more cherries than the birds and all the family could dispose of, and some for our friends. So we did not begrudge the dear little birds their share.

As there are some who can not afford to share their cherries with the birds, and others who are unwilling, we give a way of keeping them off, which we find in the *Gardener's Chronicle*, London.

"The following is a plan I once saw succeed very well for some time, but the birds at last got familiar with it; still I think it might answer for two months or so. An old gardener being greatly troubled with birds, applied to his master for nets to cover his fruit with; but no, they would be too expensive. He therefore got a hawk stuffed in what he called a hovering position, put it on the end of a long wire, attached the wire to the top of a tree, and thus had the hawk suspended in the air as if it had been alive. He had, however, another hawk which really was alive put into a cage, and had the cage put into the same tree where the dead hawk was. The gentleman in the cage was by no means mute, and I may add that I scarcely ever afterward saw birds in that garden, except perhaps a few sparrows."

Another plan that has succeeded very well at times is to suspend small looking-glasses, or bits of a broken mirror, to the limbs of the tree. Where the sun shines, and the wind blows a little, this device answers a good purpose. It is of no use at other times, except that having previously frightened the birds, and prevented them from getting a haunt in the tree, they will not be so likely to come when the mirror is still.

233. **The Food of Birds.**—A few facts to show what the food of birds really is, will do something, we hope, to dispel the prejudice which has made man their bitter enemy.

Wilson, the great ornithologist, computes that a red-winged blackbird destroys, on an average, 50 grubs a day through the summer. Many other birds are equally useful to the farmer. No gold would buy the services performed by the birds. One often may be seen following the plowman hour after hour.

Then look at the eternal labor of the birds in fall, winter, and spring, picking up the seeds of weeds, and upon these they live until grain ripens, before it is possible for them to harm the farmer.

We therefore urge farmers to spare the birds. They pay more rent than the worth of all they eat. Robins have been thoroughly proved to be insect-eaters, and great destroyers of noxious pests to the farmers, by a committee of the Massachusetts Horticultural Society.

This Society has done a deed worthy of commendation by all the lovers of birds. A resolution was moved to get the Society to ask the Legislature to repeal the law for protection of robins, upon the ground that these birds were noxious to the farmer; it being contended that their food being vegetable, they were great destroyers of valuable fruits. Upon this, Prof. Jenks (Prof. of Zoology) suggested that the Society should first learn the habits of the robin, and a committee, consisting of Prof. Jenks, C. M. Hovey, and E. S. Rand, Jr., were appointed, and have reported the following facts:

"*Plan Adopted for the Investigation.*—1. To obtain birds at daybreak, midday, and sunset. 2. To obtain birds from both the village and the country. 3. To preserve in alcohol the contents of each gizzard.

Results in Procuring Specimens.—Beginning with the first week in March, 1858, specimens have been examined at least *weekly*, and most of the time *daily*, to December, and during the winter months, at least semi-monthly to the date of the report, in the spring.

Results of Investigation.—1. Early in March, numbers of this bird made their appearance in this vicinity (Boston); but, until the second week in April, only the male birds.

2. The gizzards of those killed in the morning were, as a rule, either entirely empty, or but partially distended with food, *well macerated;* while those killed in the latter part of the day were as uniformly filled with food freshly taken.

3. From the almost daily examination of their gizzards from the early part of March to the first of May, not a particle of vegetable matter was found in the gizzard of a single bird. On the contrary, insects in great variety, both as to number and kind, as well as in every variety of condition as to growth and development, were the sole food.

But nine tenths of the aggregate mass of food thus collected during this period consisted of *one* kind of larvæ, which, through the aid of Baron Osten-sacken, secretary of the Russian legation at Washington, I was enabled to identify as the *Bibio albipennis* (*Say*), and whose history and habits, by the aid of Dr. Asa Fitch, entomologist of the New York State Agricultural Society, I was enabled to make out quite satisfactorily.

From one to two hundred of these larvæ were frequently taken from a single gizzard, all in a fresh, unmacerated condition; and usually, when these larvæ were found, they were the only food in the stomach.

To quote from a communication received from Dr. Fitch, he says: 'My attention was first directed to this fly some twelve years ago, when I was occupied in investigating the wheat midge. I observed it to be so very common in fields of growing wheat that I suspected it of living at the expense of that grain crop; but on looking around I found it was equally as common everywhere else—resting upon the grass, leaves, and flowers in my yard and garden, as well as in meadows, pastures, and forests. * * * * * It comes abroad about the 20th of May, and continues about a fortnight. You will readily recognize it by its commonness, and its white transparent wings; its body being black, clothed with soft, white hairs. It is very sluggish, moving around but little, and is easily picked up by the fingers. * * *

On page 764 of the London *Gardener's Chronicle* of the year 1844, is a valuable article of Ruricola, (J. O. Westwood), giving a full history of the *Bibio Marci*, the European analogue of the one in question. 'It appears these insects (unlike most others of the family Tipulidæ to which they pertain) are most pernicious, the larvæ feeding upon the roots of plants, sometimes to such an extent as to cause them to wither and die. Ruricola states that the larvæ of the Merci, and other allied species of Bibio, are frequently sent to him by gardeners, who find them to be mischievous in their strawberry beds, vine borders, flower pots, and other situations where the soil remains undisturbed during the autumn and spring.' And another writer, Bouché, says 'that his bed of ranunculuses was completely demolished, for several successive years, by these worms eating the roots.' From these facts every one will perceive that the robin, consuming, as you found it to do, from one to two hundred of these Bibio larvæ daily, during the months of March and April, has probably been ridding our gardens of these vermin every year hitherto; thus rendering us an important service, of which we have been wholly unaware. * * * The larvæ are gregarious; living together in swarms, and perforating the ground so that it resembles a honeycomb.

'This is probably caused by the parent fly depositing her whole stock of eggs in one spot, she being too lazy and slothful to wander about and distribute them in different places. Hence the robin, on finding one of these worms, knows that there is a host of others at the same place, and thus repairs to that spot, day after day, and gluts himself with them till the whole colony is exterminated.'

To this extract I may be allowed to add, that my own observations, during the past year, confirm the conclusions of Dr. Fitch respecting this larva in every particular, having found its colonies in November, and observed the fly in early summer. I may also here introduce an extract from a communication of a lady friend, under date of Oct. 7, 1858. She says: "On speaking of your remarks concerning the food of the robin, at the Teachers' Association at Bridgewater, in June last, to my father, he told me of a little circumstance which I thought just proved your statement. It was formerly the custom to have a shooting match on election day in May. On such an occasion in North Bridgewater, about the year 1820, a great many birds were killed, so many that a man bought them by the cart-load for the purpose of enriching his land. In consequence, there was a great scarcity of birds in that vicinity, and a great amount of grass land seemed to be injured, but from what cause no one knew. The grass withered and turned dark-colored, as though it had been burnt, commencing in small tufts and spreading in large circles." It would seem that the insect under consideration would, growing undisturbed, produce precisely this result.

4. During the month of May, the Bibio larvæ entirely disappeared from the gizzards, but up to the 21st of June, was replaced by a variety of insects or worms only, including spiders, caterpillars, and beetles of the family

Elateridæ, the parents of the well-known wire-worms, so destructive to corn and various other seeds when committed to the ground.

The earth-worm I found to be a favorite food for the young bird, but sparingly employed by the adult for its own use.

5. From the date of June 21, I began to find strawberries, cherries, and pulpy fruit generally, but in a majority of the examinations intermingled with insects, which led me to conclude that they were not fond of an exclusively vegetable diet, but rather adopted it as a dessert, and from the ease of procuring it, particularly during the enervating season of *molting*. At this season of the year, I discovered a marked difference in the food of the birds killed near or in the village, and those killed in the country at a distance from gardens and fruit-trees, the latter having less stone fruit and more insects in their gizzards, which led me to conclude that the robin is not an extensive forager.

6. The mixed diet of the robin seems to continue from the ripening of the strawberries and cherries to October, the vegetable portion consisting, during August and September, in great part of elderberries (*Sambucus canadensis*) and pokeberries (*Phytolacca decandra*).

7. During the month of October the vegetable diet is wholly discarded, and its place supplied by grasshoppers and orthopterous insects generally.

8. Early in November—the robin migrates southward—the few remaining eking out a miserable existence, during the winter months, on bayberries (*Myrica cerifera*), privet berries (*Ligustrum vulgare*), and juniper berries (*Juniperus communis*)."

Here is something further upon the food of robins: In the report of the proceedings of the Boston Society of Natural History in September, 1858, we find an instructive paper from Prof. Treadwell, of Cambridge, giving a detailed account of the feeding and growth of two American robins (*Turdus migratorius*, Linn.), during a period of 32 days, commencing from the 5th of June.

"When caught, the two were quite young, their tail feathers being less than an inch long, and the weight of each about 25 pennyweights—less than half the weight of the full-grown bird. Both were plump and vigorous, and had evidently been very recently turned out of the nest. He began feeding them with earth-worms, giving three to each bird that night; the second day, he gave them ten worms each, which they ate ravenously; thinking this beyond what their parents could naturally supply them with, he limited them to this allowance. On the third day, he gave them eight worms each in the forenoon; but in the afternoon, he found one becoming feeble, and it soon lost its strength, refused food, and died. On opening it, he found the crop, gizzard, and intestines entirely empty, and concluded, therefore, that it had died from want of sufficient food, the effect of hunger being perhaps increased by cold, as the thermometer was about 60°. The other bird, still vigorous, he put in a warmer place and increased its food, giving it the third day 15 worms, on the fourth day 24, on the fifth 25, on the sixth 30, and on the seventh 31 worms. They seemed insufficient, and the bird appeared to be losing plumpness and weight. He began then to weigh both the bird and its food, and the results were given in a tabular form. On the fifteenth day, he tried a small quantity of raw meat, and finding it readily eaten, increased it gradually, to the exclusion of worms; with it the bird ate a large quantity of earth and gravel, and drank freely after eating. By the table, it appears that though the food was increased to 40 worms, weighing 20 dwt. on the eleventh day the weight rather fell off; and it was not until the fourteenth day, when he ate 68 worms, or 34 dwt., that he began to increase. On this day the weight of the bird was 24 dwt.; he therefore ate 41 per cent. more than his own weight in twelve hours, weighing after it 29 dwt., or 15 per cent. less than the food he had eaten in that time. The length of these worms, if laid end to end, would be about fourteen feet, or ten times the length of the intestines. To meet the objection that the earth-worm contains but a small amount of nutritious matter, on the twenty-seventh day he was fed exclusively on clear beef, in quantity 23 dwt.; at night, the bird weighed 52 dwt.—but little more than twice the amount of flesh consumed during the day, not taking into account the water and earth swallowed."

A man eating in the same proportion would consume 70 lbs. of flesh and five gallons of water. Four young robins would require, according to the consumption of this bird, 250 worms, or their equivalent in insects or other food, daily. After the thirty-second day the bird was fed for eighteen days on an average of 15 dwt. of meat, two or three earth-worms, and a small quantity of bread each day; the whole being equal to 18 dwt. of beef, or 36 dwt. of earth-worms; and it has continued to eat this amount to the present time. The food was never passed undigested; the excretions were made up of gravel and dirt, and a small quantity of white semi-solid urine.

Every admirer of trees may derive from these facts a lesson, showing the immense power of birds to destroy the insects by which our trees, especially our apples, elms, and lindens, are every few years stripped of their foliage, and often many of them killed. The food of the robin, while with us, consists principally of earth-worms, various insects, their larvæ and eggs, and a few cherries; of worms and cherries they can procure but few, and those during but a short period, and they are obliged therefore to subsist principally upon the great destroyers of leaves, canker-worms, and some other kinds of caterpillars and bugs. If each robin, old and young, requires for its support an amount of these equal to the weight consumed by this bird, it is easy to see what a prodigious havoc a few hundreds of these must make upon the insects of an orchard or a park. Is it not, then, to our advantage, to purchase the service of the robins at the price of a few cherries?

Speaking upon this paper, the editor of the Newark (N. J.) *Advertiser* says:

"There is so little knowledge of the habits of birds, and their ways and means of gaining a living in the world, that anything which promises to produce better acquaintance with them ought to be generally made known.

"It will be seen by this account, that quite a young robin died from starvation, because it was allowed but eight or ten earth-worms a day. The survivor was afterward treated more generously, and his fare was increased from day to day, till he had for his dinner 68 worms, or 34 dwt., though the robin himself weighed only 24 dwt., thus consuming in twelve hours 41 per cent. more than his own weight.

"After the bird was fully grown, he continued to eat one third of his own weight in clear flesh daily! A man with such voracity (inferior, however, we have seen to that of the young bird while growing) would have some difficulty in finding board in any of our cities. But nature is not obliged to go to market to sustain her children with comfortable food. This same robin, if permitted to be free to satiate his prodigious appetite, not chiefly on cherries or other fruits valued by man, but upon man's enemies, would range himself on the side of man, and slaughter the numberless insects of every variety which are destructive to his crops. Here we have reason to be grateful for the prodigious appetite of the robin, and thank him for his extraordinary gormandism. This guest at the table of nature is addressed in very different language from guests generally. She says to him, Will you take something further? pray don't spare, but help yourself to the spider, the canker-worm, the measurer, the caterpillar, grub, slug, and bug, and help yourself also to a score or two of curculio's eggs. Thus, 'more the merrier' is the sentiment of nature's feast. How the insect tribe, and all the wicked fry who infest our fruits and cereal crops, fall before the all-devouring robin! Even the ugly bug that is said to infest and feed upon the tubers and tops of the potatoes, producing thereby the blight or rot, might be exterminated, if the robin and other birds were not destroyed or frightened away by boys, or men as stupid or mischievous as boys.

"For what had been remarked of the voracity of the robin, is probably true with respect to other birds. Men have but recently come to the knowledge that they are the most effectual protectors they can have of their fruits and crops; but nobody till now has been aware of the full extent of the obligation they are under to even a few birds in consequence of their being such enormous eaters. If their board costs them anything, they never could be able to stand it. But it does not—only now and then a life or two among them, taken by some rascal or vagabond, who should be their true benefactors, for they are busy in the service of man."

This bird, the robin, is probably known to nearly every one who will read this volume; but we will add the following short description:

The robin measures nine inches and a half in length. His bill, which is about an inch long, is strong, yellow, and dusky near the tip; the head, back of the neck, and tail are black; the back and rump, ash color; the throat and upper part of the breast are black, the former streaked with white; the whole of the rest of the breast down as far as the thighs is of a dark orange; belly and vent, white; legs, dark brown; claws, black and strong.

It builds a large nest, often on an apple-tree, which it plasters on the inside with mud, and lines with hay or fine grass. The eggs are from four to six, bluish green, unspotted. They feed on worms, insects, fruit, and berries, especially those of the sour gum-tree (*Nyssa sylvatica*). When fat, the robin is in considerable esteem for the table.

These birds are among our earliest songsters. Even in March, while the snow yet mantles the fields and woodlands, he will mount a post or leafless tree, and make an attempt at a song.

They are ornamental to every farm, and should be encouraged to build their nests in every garden.

234. **Birds Destroying Grasshoppers and Worms.**—Last year, in the neighborhood of Philadelphia, there was a swarming pest of grasshoppers. By-and-by, when every one was at his wits' end to know what to do to get rid of this scourge, there was a sudden appearance of immense flocks of plover, which spread themselves over the fields, and devoured with avidity the grasshoppers. Some of them have been shot to test the matter, and their crops have been found full of grasshoppers. The ravages of the latter soon cease wherever the flocks of plover appear, as the great number and voracity of the birds render them more than a match for the insects. Up to this visit of plover, the only relief from this calamity was the eagerness with which the fowls devoured the grasshoppers. Turkeys, the most efficient adversaries of these insects—because the largest and most active—have thriven wonderfully upon them. So have the ducks, geese, and chickens. If farmers prefer to be annually eaten up by insects, they will continue their insane warfare upon birds. On the contrary, let them be protected, and encouraged to build their nests in the very windows of our dwellings, and see what myriads of pests they will destroy!

In one of the years that I lived on the Western prairies, there was an irruption of greedy devourers of farm crops, known as the army worm, coming from no one knows where, nor when to look for its march. It is easy to trace it, however, after it has marched over a country, for it consumes every leaf of grass and grain, wherever the army spreads itself.

Farmers sometimes plow a deep furrow around a field as the army approaches, and this furrow will soon fill up with worms, which are crushed by a log drawn over them; repeating the operation every day. This is troublesome, and not always effective. In the year alluded to, the army approached just at the time it would be destructive to the wheat crop, and the owners of the most exposed farms were in sore trouble at the prospect before them. For two days they looked on in dread. "One more day," they said, "and we shall be swept." One more day came, and with it one of man's best friends, the worm-eating birds. Looking out southward where the worms were at work on the prairie grass, a black cloud was seen hovering close to the ground. It was a cloud of blackbirds, coming up from their great nesting-place in the Kankakee marshes, to feed on the worms. They saved the wheat crop. It is true that this variety of birds, when they come in great flocks into the grain-fields, are pests, but not half as bad as worms and bugs would be if not destroyed. Besides, birds can be watched and driven away from fields, where no efforts of man would serve to drive away an army of worms, marching to destroy, nor prevent his farm from being devastated by such a flight of grasshoppers as swept every green thing from a portion of Minnesota a few years ago. Birds, then, in countless numbers, will be found to be man's best friends.

235. **The Sap-Suckers.**—The name of "sap-sucker" has been given to a very useful class of birds, under the erroneous impression that they sucked the sap from the fruit-trees, where they are often seen, hour after hour, clinging to the bole of an apple-tree, patiently drilling, drilling, drilling their little bills through the bark, leaving it, sometimes, as full of holes as a honey-comb. It is a slander upon these beautiful, busy little birds to suppose their object is to suck out the sap, and thus destroy the trees. To say that the "sap-sucker" *girdles* apple-trees and destroys them, or taps the Austrian and Scotch pines so as to cause them to bleed to death, we must have stronger proof than slipshod statements.

In argument against the birds, it has been stated that they have been shot while in the very act of

"Tapping the hollow beech-tree,"

and their craws examined without finding a worm, and nothing but pieces of bark, thus proving their object to be eating the bark, if not sucking the sap, and that they were therefore very injurious to trees. These microscopic examinations only prove what we have long believed, that the bird can not always tell where the worm is that he wants, and so has to bore until he finds him. It is not likely that he goes far amiss, and probably hits him oftener with the first hole than he fails. It is thought by many persons that that troublesome little destroyer of fruit, the curculio, deposits its eggs in the bark of trees, and that that is what the sap-sucker is after. It is certain that when sap-suckers abounded in our orchards, there was no complaint of curculio. In our opinion, a perfectly healthy tree, free from insects, is never attacked by any of the *nut-hatch* family—vulgarly called "sap-suckers." We believe that, on the contrary, they are of essential service to man; and that it was one of the admirable provisions of nature, where everything works on an even balance, until one scale is overloaded by man, that the nut hatch should stand sentinel over the fruit-trees, and keep the pestiferous insects from getting the balance of power.

236. **Do Birds Eat Bees?**—It has long been a mooted question whether the birds known as "kingbirds" (the *Muscicapa tyrannus*) destroy bees? This bird has obtained his name from a spirit of boldness in attacking and driving away birds of much larger size and power, enough to kill him at a single stroke. He has obtained the name of a destroyer of honey-bees, and war to the death has been declared against him, on the evidence of his bad name, and, as we think, without anything like a fair trial.

A few years ago we elicited a great deal of testimony upon this question. One witness, Mr. Nathaniel M. Tobey, of Tompkins County, says he is an old farmer, has kept bees ten years, and always encouraged birds to make their homes upon his premises. One season, observing two kingbirds about his hives, he was curious to know what they were after, and ascertained to his satisfaction that they caught bees on their return to the hive, not to eat them bodily, but to disembowel them and despoil them of the "honey-sack." He attributed the non-swarming of the bees to this pair of kingbirds, but says his bees have never been molested since.

That the kingbirds caught Mr. Tobey's bees we have no doubt, since he says he saw the disemboweled carcasses under the trees where they alighted, but that one single one of them was a worker we do doubt, and that a single pair of kingbirds were the cause of the non-swarming of several hives of bees, we have no doubt upon the subject—we know it was not the case—it would be a preposterous absurdity to believe such a wild tale. We do not believe that all the kingbirds in the world ever destroyed a hive of working-bees, and a man who will kill the innocent birds without better proof of their guilt, than all that we have heard, is at heart a—bird murderer.

Other persons declared that they had often seen kingbirds catch bees, on the wing, near the hive. This we do not doubt, because others have seen the same thing, and have killed and dissected them and found bees in their craws. But in every case where they were examined by persons competent to decide, they have declared that none but drones were ever found. Upon this point the instinct or observation of the bird is perfect; and this may have been one of nature's provisions, that these birds should be assistants of the workers, and not their destroyers. Certainly, until we have some better evidence against the birds, we shall advocate their protection. Surely, if they eat bees, they also eat other flies, and if permitted to live and multiply around our dwellings, might keep us free of a great many pestiferous insects. If a bird can eat a stinging-bee with impunity, it can also eat a wasp or hornet, and so destroy that family.

237. **Swallows, Swifts, and Martins.**—In our boyhood, swallows were looked upon as pests of the farm, or rather the barn, and war was often waged upon them by the boys, with the countenance of those who should have been well enough informed to teach them better. We hope the day is past when any one would wantonly destroy these beautiful birds.

Hirundo is the generic term applied to the class of birds comprised in the several species of barn swallows, bank swallows, chimney swallows, and a large, strong sort known as swifts, and the common martin, for which many New England people are careful to provide boxes, which are often attached to the dwellings. Their first appearance in spring is hailed with delight, and the time of their coming often noted, so as to compare one year with another. Although "one swallow does not make it spring," people have learned to think that many never come until spring is fairly opened.

The *Hirundo* family are all birds of passage. They go far south to winter, and return with great regularity to their old haunts, to build their nests, rear their young, and catch flies, till autumn approaches, and then they are off. They cross the parallel of 40°, on their northern journey, about the first of May.

The barn is often tenantless at night, and alive with the twitter of swallows the next morning. To talk about their hybernating in the mud, or in hollow trees, is simply ridiculous. You might just as well expect wild geese to go down into the mud to winter, as for the swallows to do so.

The following description of some of the rare varieties of the *Hirundo* we found in the *Country Gentleman* newspaper, and thought it interesting:

"The Cliff, or Republican Swallow, *Hirundo lunifrons*, or *H. fulva*, is a well-known swallow among farmers. Its crown and back are of steel blue, belly white, length five inches, plus, and the stretch of the wings twelve inches, plus. They formerly occupied the cliffs of the Rocky Mountains and the fur countries. One of the first records of their appearance in the States was at Henderson, and Newport, Ky., on the banks of the Ohio, in 1815. In 1817 they were observed at Whitehall, N. Y., near Lake Champlain. These birds are of social habits, building their nests in clusters, or near each other. Vieillot observed one at sea, off Nova Scotia, long before this. They have long been known in that province. In 1818, it is stated that they began to build at Crawford's, near the base of the White Mountains. General Dearborn saw their nest at Winthrop, Me., in 1830; also in Gardiner. The writer first saw them in Worcester County, Mass., about 1838. Their nests are arranged frequently along under the eaves of a barn, in the form of a projecting retort, constructed of pellets of earth, with an internal lining of dried grass, in which are laid four eggs. Their note is not a twitter, but, according to Audubon, resembles in sound the rubbing of a moistened cork in the neck of a glass bottle. Within a quarter of a century they have become the favorites of many New England farmers.

"The Violet-green Swallow, *Hirundo thalassina*, tail acutely emarginate; back a soft, velvety green, shaded with purplish violet; length five inches, and the stretch of the wings twelve inches; is common in the Rocky Mountain region. They are the associates of the cliff swallow, just described, their note being more like that of the barn swallow. Their nests resemble those of the cliff swallow, wanting, however, the pendulous neck. They sometimes occupy the deserted nests of their associate species. They are not common east of the Mississippi River.

"The White-bellied Swallow, *Hirundo bicolor*, is of a glossy, metallic green above, and white below; hence its common name. Its length is six inches, and the stretch of the wings is twelve and a half inches. It is not as common as the barn swallow, and is allied somewhat to the purple martin. Their note is a shrill, lively, warbling twitter. They are usually the first swallows that appear in the spring. They breed in some deserted house or hollow tree. They use no mud in building their nests, which are lined with feathers.

"The Rough-winged Swallow, *Hirundo serripennis* of Audubon, and *Cotyle serripennis* of Bonaparte; color above a light, sooty brown, and beneath a whitish gray; length five and a half inches, and the stretch of the wings twelve inches.

"The Chimney Swift or Swallow, *Hirundo pelasgia* of Linnæus, and *Chætura pelasgia* of Stephens; color a sooty brown; length five inches; the stretch of wings twelve inches; the tail is short and mucronate. They build their nests frequently in chimneys, sometimes in hollow trees. They are small and shallow, and are attached to the side of the chimney or tree by an adhesive gum or mucilage secreted in the stomach of the architect. They feed their young through the greater part of the night, as the writer has frequently observed. The noise they make in passing down and up the chimney resembles distant thunder.

"Vaux's Chimney Swift, or the Oregon Swift, resembles the one described above; length three and a half to four and a half inches; stretch of the wings ten inches, plus. This species is not rare on the Western coast.

"The swallow tribe are remarkable for their social habits, living generally in colonies, constructing their nests together; and when the season for migration arrives, they leave in large flocks. They usually rear two broods or more per pair during the summer. They frequent watery places or swampy lands, ponds, etc., in pursuit of winged insects, which they take on the wing. In fair weather they usually fly high in the air. As the air becomes less dense, the insects fly nearer the earth, and the swallows skim near the surface of the earth or water, which prognosticates rain at hand. The number of flies, gnats, etc., annually consumed by swallows exceeds all calculation. Hence the truth of the observation of a farmer, whose barn-eaves had beneath them one connected line of cliff swallows' nests: 'I am very glad to have these birds here, for my cows and milkers are much less troubled with gnats and flies than before these swallows came in such numbers.'

"Some farmers try, unwisely, to exclude swallows from their premises, because, say they, 'these birds make dirty work.' Granted, but it is far less troublesome and annoying than the insects of the kinds named, which greatly multiply in the absence of the swallows, swifts, and martins."

Barn swallows and martins are too widely known to make a description of them interesting in this place. Children, however, should always have an opportunity of seeing their portraits and reading their history in Audubon or Wilson, as well as that of every other bird, and, by learning their habits, judge which is and which is not beneficial to the farmer. Swallows and martins would certainly not then be doomed to destruction. D. W. Warner, of Sharon Springs, N. Y., says:

"My father repeatedly attempted wheat-growing, but as often failed, the weevil taking the whole crop, until a large colony of martins established themselves under the eaves of the barn, since which time he has raised good crops of spring wheat. The wheat has been grown within one hundred rods of the barn. *Query*—Had the martins anything to do in preventing the appearance of the weevil?"

238. **Skylarks and Imported Birds.**—Several attempts have been made to

introduce skylarks into this country. In February, 1853, John Gorgas, of Wilmington, Del., received a lot of twenty, which were kept confined until the 19th of March, when they were set at liberty. Another lot of twenty-two arrived April 18th, and were set at liberty the next day. This was only twenty-two days from the time they were trapped in England. These birds propagated in the neighborhood that season, and strong hopes were entertained that the English skylark had been introduced permanently into this country; but these hopes have not been realized. A letter from Mr. Gorgas, in the summer of 1860, indicates that the birds have all disappeared.

There was also another lot of skylarks imported, and liberated in Greenwood Cemetery, on Long Island, in the spring of 1853, and still another lot were set free in Washington city, at a later period; but, so far as we can learn, all of these birds have disappeared. This is greatly to be regretted; for besides the interest of their curious flight and song, they are great insect destroyers. Their home is in the grass and grain fields, and their food in summer is entirely composed of insects and worms that are pests to the farmer. In Europe they inhabit a wide range of latitude, feeding in winter upon seeds of grass and weeds, and, if located too far north, making a short migration to a milder clime. It can not be owing to the cold that they do not succeed here; but it is not improbable that the cold has prompted them to move southward, and they have not felt disposed to return. We still hope the skylark will have its home with us, as common as in England, where it is so noted as a song-bird. Its flight skyward is also very curious. It ascends perpendicularly, as though it screwed itself through the air, until quite out of sight, and after a little descends in the same way. The skylark in Europe is a fine table luxury, notwithstanding they afford but half an ounce each of meat to the epicure. Vast numbers of just as diminutive birds are sacrificed upon the epicurean tables of all our large cities in the United States.

To those who may take an interest in the importation of birds, the following account will be useful, as given by Mr. W. Brodie, of his successful transportation of English pheasants, gold pheasants, and partridges from England to New Zealand. He says:

"I left the St. Katherine's Dock with thirty-six pheasants and partridges on board, and after a long and most disagreeable voyage of 261 days, landed in Auckland, New Zealand, with the same number as I had left England with. It is a pastime to cabin passengers going a long voyage to have some occupation to break the monotony of shipboard imprisonment. I therefore looked after my own birds, cleaned them out every morning, gave them fresh red gravel (coarse) every other day, supplied them bountifully with fresh water (not water caught on deck after a heavy rain, as there is a certain quantity of tar in it), never allowed them a fresh-water bath, fed them with buckwheat, wheat, canary-seed, and hemp-seed alternately, week and week about, kept them in wicker cages made on purpose, three feet long, two feet wide, and one foot high, and padded the top inside the lids of the cages, to protect their heads.

"These birds were kept on deck the whole of the voyage, with a painted canvas cover to protect them from the salt water in bad weather. Hence my success. The increase of my birds has amounted to tens of thousands. In the northern part of New Zealand they breed twice a year, and they have stocked the province of Auckland, 200 miles distant from the point where they were first sent adrift, which was upon one of my estates, near the North Cape of New Zealand. In the early part of 1859 I sent out 400 house and hedge sparrows and yellow-hammers to Auckland; and I hope in September to send out 400 singing birds to the same port gratuitously. Birds should not be sent out between March and September; those sent in April or May are sure to pine away and die, it being their pairing season."

By pursuing the course adopted by Mr. Brodie, we might have some of the most rare birds of California brought to the Atlantic States, with undoubted profit to the importer.

239. **Laws for the Protection of Birds.**—The State of New York has had what is called a "game law" for a good many years; but it was a law for the protection of a class of men and boys who, without any claim to the title, called themselves "sportsmen"—such sportsmen as would shoot a robin-red-breast on her nest, or an imported skylark in the midst of his song. The law was only incidentally beneficial to farmers, so far as it protected game birds, the most of which are great insect-eaters. There is not a farmer in all the old States that can afford to have a quail killed upon his farm, if he was paid a dollar a head. This species of wild bird would be semi-domesticated, if man would allow it to be so. We have seen them so gentle that they often came around the barn for food in winter, and only walked slowly away at the approach of man. At such a time we would not kill one for ten times its value as food. All the past summer we had the delight of knowing that a pair of these beautiful birds were safely rearing their young only a few rods from our home. Often, as we walked about the little farm, they were seen dodging along some path, or between the corn-rows, or into the shelter of the grass or shrubbery. Then, with what sweet satisfaction we listened to "Bob White," sitting upon the wall, telling us almost unerringly of the approach of "more wet!"

An Illinois farmer declares that a flock of quails made him a crop of corn, having voluntarily taken upon themselves to rid the field of cut-worms. "I never," says he, "can again consent to the destruction of these valuable birds. I used to shoot and trap them, but I was ignorant of their value on the farm.

A neighbor of ours, a true sportsman, said to us, the other day: "I have done shooting quails. I used to think it real sport to wing these beautiful birds; and the temptation to do so was enhanced by the delicious food they afford. I really think that I never shall shoot another quail in my life."

In answer to our "Why?" he said:

"I had never studied their history, and the nature of their habits, and character of their food, until this season. I was incited to do this from meeting with a pair of the birds every time I walked over a certain portion of the farm. They were almost as gentle as the fowls in the door-yard, and frequently I noticed them so busily engaged picking up worms in the corn-field, that it led me into a train of thought and study that has taught me not to kill quails. A few days ago I saw my pets—for such I had come to regard them—with sixteen young ones, each nearly as large as its parent. If I could guard that flock from the depredation of idle boys, no money would buy them. Why, what useful as well as interesting birds they are! We want stringent laws, well enforced, to protect quails."

Yes, but, most of all, we want information for farmers of their value.

The following are the penalties of the New York Game Law, passed April 14, 1860:

It is $25 fine to kill a deer in the first seven months of the year.

It is $2 fine to kill a woodcock between January 1 and July 4; or a partridge (ruffled grouse) between January 15 and September 1; or a quail between January 1 and October 15; or any wild duck between February 1 and August 1.

It is $10 fine to kill a prairie fowl, or pinnated grouse, at any time within five years.

It is $10 fine to trap or snare quail or grouse.

It is 50 cents fine to kill, trap, or snare a nightingale, night-hawk, blue-bird, yellow-bird, oriole, finch, thrush, lark, sparrow, wren, martin, swallow, woodpecker, or any other harmless bird, at any time; and bobolinks and robins only between February 1 and October 1.

It is $5 fine to catch brook or lake trout, or muscalonge, between September 1 and March 1; and it is $2 fine to catch them in any way but by a hook and line.

It is $5 fine for any person to enter the premises of another with fire-arms, or other hunting or fishing implements, with the intent of using them; and if he enters upon a cultivated field, orchard, or garden, or where crops are growing, in pursuit of game, without the consent of the owner, he is finable $10 for each offense.

Such is the law now in force in this State. Let all who are interested see that it is made effectual. The difficulty in the way of its enforcement is a very lax state of morals among the people, many of whom consider birds free plunder; and they have so long enjoyed the privilege of rambling over everybody's land, as freely as though they owned it, that it is hard to convince them that they do not. The contrary can never be taught in courts, nor by fines and prisons; it must be taught in our common schools and around the farmer's fireside.

New Jersey has a good law upon her statute book for the protection of small birds. It is difficult of enforcement, because the mass of people have been educated to look upon all birds as noxious, or else worthy of destruction for food, and of no other value. They do not even look upon poultry in any other light. Yet the truth is, poultry is worth ten times as much to the farmer for the work of destruction it does upon his pests, as it is for the food it affords him. It is just so with game birds; and if the owners of land well situated for game preserves were able to preserve the birds, the cultivated portions might be benefited, and the owners could make the keeping of wild birds as profitable as tame ones.

From time to time laws have been devised and statutes enacted for the preservation of game; but until recently such legislation has been originated by the wealthy men of cities, the men of the educated and leisure classes of the community, the consumers and killers, not the feeders and possessors, of the game or the owners of the acres. This has generally given to these statutes the appearance, though in no degree the reality, of partaking of the odious character of class legislation; of being enacted for the benefit of the rich against the poor, the proud against the humble, the men of leisure against the men of labor. The farmers, who knew little and cared less for the game which ran wild in their woods, fluttered in their tangled swamps, or screamed over their boggy morasses, did not conceive how it could have any real value in the eyes of any rational being; regarded all legislation forbidding its slaughter, except at stated periods, as a device cunningly framed for depriving them of their own natural and indefeasible rights, and for giving amusement and gratification to finely-dressed, flashy strangers from the towns, who came periodically into country places to break down fences, trample under foot growing crops, and kill the game reared on the farmer's land, which was, in its very nature, and from the mode of killing it, useless to the farmer himself. In a word, they looked upon the Game Laws as an offensive, aristocratic, unrepublican, European invention; a sort of scheme for making the rich richer, and the poor poorer—an idea sedulously encouraged by all the brawling foreigners and pot-house village loafers, who, too lazy to work, found their own profit in poaching a few starveling parent birds on the nests, or half-grown fledgeling young fry on other men's lands, which they might traffic or truck away to railway conductors and stage-coach drivers, for transmission to the eating-houses of the cities.

Gradually, however, they—the farmers, we mean—have come to open their eyes on this question. The fearful increase of insect life, the prodigious deterioration of the crops of all kinds, the threatened utter extinction of some of the most valuable American staples in the very localities of which they were formerly the pride and boast—as, for instance, the wheat crop of the famous Genesee Valley, where it is already questionable, from the yearly aggravated ravages of the Hessian-fly and the weevil, whether it is any longer profitable, or perhaps prudent, to sow wheat—have forced them to perceive that this growth and superabundance, daily and hourly aggravated and exaggerated, of insect pests is to be attributed wholly to the unprecedented destruction of small birds. At the same time, the vast and hourly-increasing demand for game in the large cities, the immense freights and cargoes of wild animals sent down yearly, so soon as cold weather allows its safe transportation by express companies and railroad cars—immense, yet still inadequate to meet the call of the markets, although the illimitable West is fast suffering depletion, and is in some States legislating against exportation—have quickened the perception of agriculturists to the fact, that if game be worth as much money in the market as poultry, or more, and can be raised at no cost and less than no trouble, it is better to have the woods, which they necessarily keep up as timber lots, the hill-sides, which are too craggy and sterile of soil to rear anything but brambles and ferns, and the morasses, which it would be too costly to drain, swarming with profitable wild animals, than waste and unprofitable; and to the other fact, that if money is to be made by killing game on their lands, it is as well at least, if not better, to make it themselves, and to go on making it, year after year, by maintaining a sufficient breeding stock, as to suffer it to be made out of their pockets by every landless, shiftless vagabond who chooses to stampede every head of game out of every farm, and who has no earthly reason or inducements why he should not kill as speedily as possible the goose which lays the golden eggs—seeing that the goose, if slain by himself, is clearly *his*, while the eggs, *in futuro*, may fall to the lot of any other Tom, Dick, or Harry of his own reputable or disreputable order.

The farmers and land-owners being thus convinced of the loss directly attributable to the killing of small birds at all, at any season, and of the great gain certainly attainable by the protection of the game during the breeding seasons, have of late, in many States and counties of States, procured statutes to be passed for the preservation, absolutely and at all times, of certain innoxious and useful small birds. But all these statutes have defects, besides the one alluded to—the lack of proper instruction to the children.

It is a defect in our State law that no penalty is provided sufficient to prevent hunting all the public highways, or other public grounds, and the penalty for entering your premises is quite inadequate to their protection, because you can not afford to procure testimony, and hire attorneys to prosecute a fellow who will verify the adage of "sue a beggar and catch a louse."

The statutes in question are not asked or enacted for the defense of private rights of private individuals, though they may defend them incidentally, but for that of the community at large, to which the safety of crops and the greatest possible supply of food of all kinds in the market, at the lowest possible rates, are incontestably benefits. Therefore the community has not only a right, but it is its especial duty to enforce the same protection and preservation of the same animals on its own possessions—that is to say, on the highways, wastes, commons, and all other unoccupied lands or waters of which the public are the guardians and occupants—as it commands on the private lands of individuals from trespassers.

So convinced are the scientific agriculturists of France of the importance of raising all those species of wild animals which are natural, indigenous, or capable of being acclimated and naturalized to the waste lands, of which there are many hundreds of thousands of acres, utterly unsuited to any other sort of culture or stocking, that there is an important department in the National Agricultural Society of that great and enlightened nation, the sole duty of which is to superintend the reproduction on the waste lands and waters of France of the native species of game which have gradually become extinct; to promote the introduction on the same lands of such foreign wild animals, valuable for food, as may appear to be suited, by their habits and the character of the climates to which they originally belonged, for naturalization in France; and, lastly, to encourage and enforce, by means of premiums for success and stringent protective legislation, the maintenance of such stocks of game, both quadruped and winged, as shall realize to the proprietors and to the state an abundant return of nutritious and cheap food from lands untillable, unfitted for pasturage, and in fact worthless for any purpose but that of raising game.

At the same time we, in America, are suffering our infinitely larger number of unreclaimed—if not irreclaimable—acres, which formerly swarmed with animal life, and afforded supplies, a few years ago supposed to be inexhaustible, of the choicest varieties of game, to be stripped of the last fin, the last hoof or pad, the last feather of the wild tribes, unequaled elsewhere, both in quality and quantity, which at the time of its discovery rendered America the paradise of Nimrods; so that the woods, the fens, the waters are indeed fast becoming utterly barren, useless, and unprofitable wastes.

It is certain that the fact of any farm being well stocked with game is not, in any possible point of view, a disadvantage, even if their value, whether as an article of food or as an object of pleasurable and healthful pursuit be entirely set aside, since the actual profit consequent on their subsistence is greater than the loss from the grain which a few of the varieties consume. Besides the insects, many of the game birds are great consumers of weed seeds. The prairie-hens, where they exist in large numbers, do depredate upon corn-fields and stacks of grain; but even there, it is not a very severe tax to feed them; and we think that farmers could make the preservation of birds profitable.

It may be assumed, as a reasonable average, that every farmer who owns and cultivates a hundred acres of arable land, with from fifty to a hundred of meadow land and pasture, and an equal quantity of woodland, if he choose to protect and preserve them, especially if he takes the trouble to erect a few little shelter huts of brushwood and fern in his woodskirts, and to bait them in hard weather with a few bushels of buckwheat, in a good game district where the winters are not too severe, may winter from ten to twenty brace of quail, which may be expected to raise from fifteen to thirty bevies of birds. Each bevy will probably average fifteen birds, which gives a yield of from seventy-five to one hundred brace of quail, to be killed and sent to market in the late autumn or early winter, with the butter, buckwheat, fat turkeys, and other produce of the farm. These birds will average twenty-five cents a brace in ordinary seasons, and when game is scarce or for any reason there is an unusual demand, an increased price. To this may be added, if it be a ruffed grouse country, two or three broods of these hardy, bold, and delicate birds, which rarely produce fewer than twelve and thence upward to sixteen poults, so that the landholder may reckon on his fifteen to twenty brace of ruffed grouse at seventy-five cents a brace, and on his thirty or forty rabbits, at a dime a head. Here is a profit of perhaps fifty dollars per annum, arising from no expenditure, from no investment of capital, and involving as a consequence, several days or hours of pleasant exercise and amusement in lieu of labor, for the purpose of rendering it marketable. On snipe grounds and countries adapted to woodcock, the profits are yet more enormous.

The number of woodcock to be killed annually on any given piece of ground is never so great as that of snipe, since the birds killed in the early part of the season consist of those bred on the ground itself on which they are shot, which is of course a limited number, although the autumnal flights, which come in successively, are those bred in the uncultivated wastes far to the northward. Yet even of these, there are numerous localities, especially in parts of the States of New York, New Jersey, Pennsylvania, Delaware, Michigan, and other Western States, which might be counted on as sure to furnish ten woodcock to the acre in each season, at twenty-five cents the bird.

It can hardly be doubted that by the system of game protecting, without expending a dollar, every owner farming from 100 to 200 acres of land in a country well adapted for game—and there is but little country in any of the Northern, Western, or Middle States which is not adapted to it—can add from $50 to $200, and in some instances a much larger sum to his annual income. If he have trout-streams, and the facility of making a chain of small trout-ponds, as may be easily done in every deep glen watered by a rapid brook, instead of suffering them to be weired and netted by all the vagabonds of the country side, he might make thousands more easily than by his poultry-yard or sheep-fold, and at far less cost.

With these facts before them, it is for the farmers themselves to consider whether game-laws are the obnoxious things that demagogues have taught them to believe. Is it not rather worth their while to insist upon the enactment, and strict observance of such laws as will protect their own interests, and afford them such additions to their income as we have briefly hinted at.

240. **Sending Wild Pigeons to Market.**—The *Eagle*, newspaper, printed at Grand Rapids, Michigan, published an article in the spring of 1860, about the pigeon trade. There had been at that time shipped from that village 588 barrels of wild pigeons—equal to 108,555 lbs. The express freight on this quantity at three cents a pound, would be $3,256 65. If sold at twenty cents a pound, they would bring $21,711. It was estimated that the west part of Michigan had sent two millions of wild pigeons to market in one season. This great number can easily be understood by those who are acquainted with the manner in which these birds flock together. To one

who has never seen a pigeon-roost or a nesting-place, the truth will seem almost as fabulous as the tales of Sinbad the sailor. Yet it is far within the bounds of truth to say that we have seen many millions of wild pigeons at once, or at least as soon as we could direct our eyes upon them. We have seen them on their evening flight toward the roosting-place, in one unbroken flock, two miles wide, and two hours' continuance. We have ridden two hours in a straight line through a pigeon-roost at least seven miles wide. We have seen upon a single beech-tree many wagon-loads. At one time a little section of the main flock got belated in reaching the roosting-place, and settled in a heavy beech wood near our house in Indiana, and the noise they made resembled a terrific tornado; and they piled on to the trees in such numbers that all the weak limbs were broken off, and hundreds of large trees, such as stood leaning, and were weak at the roots, were entirely broken down. We spent hours of the evening in that temporary roost, witnessing their operations, and trying to imagine the vastness of the multitude. There is great danger in visiting such a roost, from the falling timber. In one long occupied, all that is liable to break has been prostrated, and there is less danger, so there is less commotion. They often sit so low, and remain so quiet, that you may approach near enough to kill half a score at a blow. A charge of shot sent into a full tree brings down a great number. When they alight upon a tree that breaks under the mass, they fly and light upon the backs of others already loading a tree all it can bear, and so the additional weight perhaps produces a second crash, and sometimes crash after crash, almost without cessation. That was the case upon the evening mentioned. The breaking commenced at dusk, when they began alighting, and continued until we left at midnight. In the morning about two hundred acres were literally covered with broken timber.

A pigeon nesting-place is a still greater curiosity than a pigeon-roost. It covers hundreds of acres of dense forest, and every tree is covered with nests almost as closely as the birds can build them, by laying a few loose twigs together among the branches. It is an easy matter to load a wagon with squabs. Often they fall out of the frail nests, and fall a prey to wild animals and wood hogs. Audubon gives a very truthful picture of the immense numbers of wild pigeons in the great West. To us it is the more interesting, because we know it to be true.

Those who have read Audubon, or others who have written accounts of pigeon-roosts, and can believe the truth, will be able to realize the extent of the trade we have spoken of.

Having now, we hope, said enough about birds to create an interest in their behalf, and induce a study of their character, and their value to the farmer, we shall leave the subject for another, which, though about small things, is of great importance to all our readers.

SECTION XII.—ENTOMOLOGICAL.

What are Insects?—The term is applied to all, or nearly all, the family of bugs, worms, flies, wasps, moths, millers, and small creeping things that infest a farm, and all are generally ranked as pests, though erroneously, as we will show by-and-by, some of them being highly beneficial.

The word *insect* comes from two Latin words, signifying cut into, or notched; and the body of a perfect insect, as a wasp, is cut into and divided into three distinct segments—the head, thorax, and abdomen, with two or three pairs of legs, and one or two pairs of wings, and it breathes through holes in the sides of the body. Insects commence life in eggs, which hatch into worms or larvæ, such as maggots or caterpillars, and these, after doing immense mischief, as in that state they are voracious gormandizers, undergo transformation to the pupa or chrysalis state, and from that to the bug or butterfly form, during which the eggs are laid in such vast numbers, that the species are propagated so rapidly that the art of man seems insufficient to stay their ravages, if of a ravaging breed, and hence he must look to natural aids. It is for this that we have advocated protection to birds, because they are great insect destroyers. Pestiferous insects also have several other natural enemies, which must be studied and protected by farmers.

Besides what are considered and treated of in natural history as perfect insects, there are a great many sorts that come under the general name of insect that do not answer the above definition, such as some of the aphis, or plant-lice family, the striped and other bugs, and various worms. Some of the latter—for instance, the earth-worm, or angler's worm—are thought to be beneficial to soil. We think, rather, it could be made more beneficial in its death than in its life. Anything, such as salt, lime, potash, ammonia, that would kill all the earth-worms, would add all the animal matter of their body to the soil's fertility.

We can not go into a general examination of entomology, though we do earnestly advise a study of the science by all farmers, who are, above all other classes of the community, most in want of knowledge of insects, and how to distinguish between those that are pests and those that are harmless, or, perhaps, actual destroyers of those that are devastating our orchards, gardens, and grain-fields. Of a few of these we shall give correct pictures, with brief hints about their character, depredations, and such preventives as have been tried and proved valuable or useless.

The great difficulty with the management of the greatest pests is their diminutive size. The great destroyers of wheat, the midge, Hessian-fly, and joint-worm, are so minute that a microscope is needed for their examination. It is the same with the aphis tribe, and what is called the "scale insect," which cover the limbs of fruit-trees like a second bark, until millions of mouths, although very diminutive, suck away the life of the tree. Neither man nor bird notices these minute destroyers until it is too late to stop their ravages.

Now let us look at what some of these insect pests do to the farmer's crops. As cotton is considered the great American staple, and as America is, above all competition, the land of insects, we will first enumerate the cotton destroyers found upon that plant by that indefatigable student of entomology, Townend Glover, who was employed by the Patent Office to collect information upon the subject.

242. **Insects Infesting the Cotton-Plant.**—A species of cantharides, similar to the striped potato fly, feeds upon the nectar or pollen, and sometimes eats the petals of the flowers. These are injurious, and several others found in the flowers did not appear to be so.

A leaf beetle eats holes in the petals, and, some say, injures the bolls. A large, green, thorny, poisonous caterpillar damages the foliage in August and September. It also attacks Indian corn. If handled incautiously, its spines inflict painful wounds. This large worm is in strong contrast with the diminutive cotton-louse, which destroys the young plant in wet seasons.

The boll-worm, however, is the great destroyer. Their presence in a cotton-field is indicated by the great number of young bolls fallen to the ground, after the inside has been eaten out. Before it falls, the worm crawls out and attacks others, which in turn fall; and if the worms are numerous, all the bolls may be destroyed, just as all the plums of a tree are destroyed by curculio.

A small green caterpillar feeds upon and rolls itself in the leaves of the cotton plant; and a solitary hairy caterpillar, of a yellowish color, eats the leaves; and a green, smooth-skinned one feeds upon the blossoms; and also several very slender, brownish span-worms. A small beetle, of a greenish, metallic color, barred with dirty cream-color, often seen in the holes made by boll-worms, is not thought a destroyer. It only follows in the path of insects that do destroy.

Various other small insects are found on the plant, but it is not certain that they are destructive, while several are well ascertained to be highly beneficial to the cotton-planter. Among these we enumerate the lady-bird (*Coccinella*), which, both in the larva and perfect state, devours myriads of cotton-lice.

The planter and overseer should learn to distinguish these from noxious insects, and instruct their hands to protect them.

The larva of the bee-winged fly also destroys lice, and ichneumon flies deposit eggs in their bodies.

Tiger beetles (*Cicindella*) are also destroyers of the noxious insects. Ants climb the cotton-stalks to feed upon aphis, and not upon the plant. Spiders, too, catch moths in their nets, and also seize and devour other insects. The great aim should be to learn which of all the insects found in the cotton-field are friends, and which foes.

The boll-worm, and the one which is some seasons so destructive to Indian corn in the milk, are declared by some, upon pretty good authority, to be identical. The chrysalis is of a bright chestnut brown; the moths, a tawny yellow color. The upper wings yellowish, shaded with green or red, in some, with a dark band, and crescent-shaped mark near the center of the wing. The under wings are lighter colored, bordered with black.

To prevent depredations from the boll-worm, it is recommended to light fires around the field at night, to attract the moths when they begin to make their appearance. Doubtless many will be attracted to the light and destroyed. They have also been destroyed by placing plates upon stakes set among the cotton, in which about half a gill of vinegar and molasses is placed, mixed, four of vinegar to one of molasses. This attracts the moth, which perishes in the mixture. This kind of moth-trap requires a good deal of labor, for the plates must be visited every evening and replenished, while the moths last. The same plan will be found a good one to catch other moths than those which infest cotton.

243. **Insects Destructive to Indian Corn and Wheat.**—The insect which eats into the grains of Indian corn is not only a destructive one, but when it infests the ears that are wanted for cooking in their green state, it is troublesome and disgustingly offensive. It only feeds while the corn is in the "roasting ear" condition. At first it is so small as to be almost imperceptible, and doubtless many a one gets between the teeth of the eater of early green corn, even in this city, for here we have seen a great many marks of their ravages. It is, however, much worse at the South. Sheltered under the husk, it eats voraciously, and increases in size rapidly, until about an inch long. Some are brown, some green, some striped. In fact, there is no uniformity in color. The body is sparingly clothed with short hairs, rising from black spots or warts. The worm leaves the ear and goes into the ground to undergo its transformation.

If farmers, particularly Northern ones, would watch the first appearance of these insects, and try to destroy the moths, they might save themselves much loss in the future, for all insects of this kind are wonderfully prolific. There is an ichneumon fly which preys upon this insect, and the habits of that fly should be studied, and, if possible, the family increased. Birds, too, are fond of this species of worms; probably because the food it fattens upon makes sweet morsels for their palates.

The destruction of the grains of corn eaten by this worm is only a part of the damage that ensues. The grains eaten are upon the small end of the ear, and here grows a fungus, which often destroys the ear. It also oftentimes affords a secure harbor for other insects, which destroy what the worms have left. The corn-worm does more damage in dry seasons than wet ones, owing to the fact that the silk grows irregularly, or continues longer green, and the worms often eat off the silk before the kernel is fructified.

Another insect infesting Indian corn at the South is called *Sylvanus quadricollis*—a diminutive beetle, which hides between the grains, and loosens them from the cob, devouring the germ first, and then the white starchy part of the kernel. These insects sometimes exist in vast numbers, and are then very destructive. Sometimes they destroy the germ in such a way that its absence is imperceptible, and that causes disappointment when it is planted as seed. Kiln-drying is recommended when the corn is to be used for food, but not for seed. Quick-lime is recommended, strewed among the ears of corn in the crib. If put up with husks on, salt has proved beneficial.

There is another insect that troubles corn in the Southern States—the corn-borer. This is called a bill-bug, or corn-borer. It bores into the stalk just at the surface of the earth, and deposits its eggs. The grub eats the substance of the stalk, and the transformation takes place in the cavity eaten out, where the pupa remains till spring, and then comes forth a beetle, in its turn to deposit eggs in the young corn.

These insects have been very destructive in Alabama and several other Southern States, and, like many other pests, may gradually become acclimated farther and farther north, till all the corn-growing region is infested. Farmers should be on the look-out for these "borers," and also bear in mind that the best remedy yet found is to pull up all corn-stalks, after harvest, and pile and burn them. These insects are usually most troublesome in swamp lands.

The larva of the angoumas moth is very destructive to corn, as well as wheat and other cereals, when stored; and in the South, in the open field. The grub is one fourth inch long in corn, and less in wheat. It spins a cocoon in the cavity eaten out when it goes into the pupa state. From a small round hole previously made, it emerges a moth, with long, narrow wings, of a yellowish gray color, of satin-like luster, fringed with long hairs. The insects grown in maize are larger, though identical with the wheat insects. This insect is not confined to warm latitudes, but is more troublesome there than farther north. We have seen the moths swarming in myriads about corn-houses and around wheat-stacks. The female lays from sixty to ninety eggs, which hatch into minute white worms in four to six days, each one of which makes a lodgment in a grain of corn, where it eats, and matures in three weeks; so that two sets mature in one season, the pupa of the second growth remaining in the grain till spring.

It is said that this insect was first observed in North Carolina, about forty years ago. They will fly into a candle sometimes, in a granary, in such numbers as to extinguish the light, and doubtless could be destroyed by fire to a great extent. Smear a cask with one head, on the inside, with tar or molasses, and place a light in it, and you will catch quantities of the moths.

Where they abound, it is advisable to store corn unhusked; and salt is also useful, sprinkled in as the corn is put in the crib, just as hay is salted.

We know places where this insect is so troublesome to farmers, that it is only by great care that they can keep corn or wheat over from one crop to another. In west Tennessee and northwest Mississippi they are excessively annoying.

Several remedies have been tried, with success in some cases and failure in others, under apparently the same circumstances. We will name some of them. After the grain is thoroughly cleaned, spread it upon white sheets, or boards, or a tin roof, or, if convenient, a flat rock is better than either, and some use a clay floor, and let it lie in the sun until it gets hot, and then put it up in tight casks. Kiln-drying at 176° kills the insect and the germinating power of the corn at the same time. If grain is placed in tight casks, and the gas arising from burning charcoal conveyed to it by a tube, which may be iron next the fire, and flexible tube next the cask, for convenience, so as to fumigate the grain, the insect is destroyed without injury to the germ. An infusion of the fumes of chloroform will kill these or any other insects in a close vessel. Even a few drops put in a bottle with insects, corked up, deprives them of life directly. It will not, however, destroy eggs, as the heating of the corn does. Heating it, by piling it up damp, has been practiced; but care must be taken, if this is practiced, that it does not overheat and get musty. If it does, it should be washed before grinding.

Lime has been effectively tried, entirely preventing the ravages of the insect, by storing the grain, ready prepared for the mill, in tight casks or bins, and covering by sifting over the top an inch or two deep of finely-powdered lime. Whenever the grain is wanted for the mill, run it through the winnowing machine, and blow out the lime. A trifle will adhere to the furze of the kernels, but it does no harm—it is rather beneficial to the flour or meal.

244. **The Rice Weevil.**—This is another pestiferous insect, which not only destroys rice, but attacks other grain upon the upland portion of a rice plantation. This weevil (*Calandra orysæ*) resembles the one whose ravages we have noticed in 243, which is the *Calandra granaria*. All true weevils are beetles, with long snouts, and only depredate upon dry grain.

Many of us consumers of rice have seen the rice weevil, which has hatched out of eggs deposited by the female parent, one in each grain, where it hatches, and the young larva eats out all the substance, making food of its habitation. By-and-by the weevil comes out, and the sexes meet, and the female deposits its eggs in sound grains, and so on until all are destroyed.

When very plenty in rice, it makes anything but a savory dish. It is the same with wheat. We have eaten bread that tasted as though we had about an even mixture of bread and meat. "Weevilly flour," we have heard said, was not unwholesome. Perhaps not; to us it is most decidedly unpalatable, and no art of cooking wheat or rice will hide the weevil flavor. It looks and tastes of weevil, even in the buttermilk and saleratus biscuit of the most liberal user of that salt.

The rice weevil has often been found in rice imported from China, and it may have been introduced into this country from thence. It differs, both in appearance and habits, a little from the grain weevil. It is said to attack rice in the field as well as after it is stored. It also attacks Indian corn in the field, if left out till late in the fall, or until it becomes quite dry, in those States at the South where this insect most abounds.

The same remedies that will answer for one variety of weevil will answer for all. We give a few more remedies.

245. **To Destroy Weevil.**—Grain subject to depredations from the weevil, which develops and matures in the heart of the seeds, and which imparts considerable heat to the bulk of the pile, equal to or above blood-heat, is easily detected on thrusting the hand into the body of the grain, by means of the great heat of the mass.

In France, large quantities of grain are stored up against time of scarcity; and in order to protect it from the depredations of the insects that prey upon it, commissioners have been appointed to examine into the means of destroying them, who have reported that a small quantity of chloroform or sulphuret of carbon put into the interior of the grain pit (which is usually in the ground), and then hermetically sealed up, will destroy all the pests. About seventy-five grains of sulphuret of carbon are sufficient for about four bushels. Grain put up in rail pens, as is the custom in the West, may be treated with equal success with this agent, by covering the heap with a tarpaulin or close woven cloth.

A successful farmer in Broome Co., N. Y., recommends cutting wheat while in the milk, and the straw green, and salting it in the mow or stack. He says:

"About fourteen years ago the weevil appeared upon this farm, and quite seriously affected the wheat crop. We commenced also about that time cutting our wheat very green, as soon as it was out of the milk, no matter how green the straw or heads; and in order to preserve it the better in the mow or stack, always applied *salt* liberally. For many years I have salted my grain mows and stacks, but put none upon my hay. I am now cutting my wheat as green as usual.

"From my own experience, I am satisfied that if the wheat is thus treated, and not thrashed until after it has been some time piled up, the insect will be destroyed in some of its transformations. At any rate, whoever tries the experiment will be well surprised in the value of his wheat and straw. Where straw is fed to stock—and all mine goes that way—it is sought for with keener relish, and makes better manure, while the wheat is much heavier and plumper than when not so treated.

"I ought to say, perhaps, that the weevil has not troubled the farm since that year, although wheat has been grown every year. Almost any year a few may be found, but none to do any damage. My soil is a slaty, gravelly loam, and my seeding is usually all done from the 1st to the 10th of September, and the best variety of wheat thus far has been the *blue-stem*, a beautiful variety of white wheat."

Another Broome County farmer, who thought the yellow-birds destroyed his wheat, wished a neighbor "would get a gun and kill some yellow-birds, which farmers generally suppose destroy the wheat. Mr. R. declined, as he does not like to kill birds of any kind. Out of curiosity, however, he killed one of the birds and opened the crop, when he found that the bird, instead of eating the wheat, ate the weevil—the great destroyer of the wheat. He found as many as two hundred weevil in the bird's crop, and but *four* grains of wheat, and these had the weevil in them. This is a very important discovery, and should be generally known. The bird resembles the canary, and sings beautifully."

246. **Wheat Insect vs. Weevil.**—There is a confusion of tongues in relation to the weevil that we have described (244, 245), and the one that attacks the wheat in the milk.

The insect that has injured the wheat crop so extensively in New York, Pennsylvania, and Ohio, is not the one generally known as *the weevil.* This insect, called "red weevil," "wheat-midge," "the insect," etc., differs very much from the *Calandra granaria*, as that only injures the ripened kernel of wheat or corn after it is stacked or housed, or even after it is in the bin of the granary or grist-mill. The weevil exhibits in swarms around the barn, the female laying her eggs on the grain, and the grubs as soon as hatched work into the kernel, consuming all but the bran, without breaking that, so as to show that all is rottenness within. The ravages of this insect, as we have already stated, are so destructive at the South, that it is difficult to keep wheat and corn. The latter is generally put up with the shucks on, which is damp or else heavily salted. Wheat is kept in close casks or tight bins by covering with flour of lime an inch deep over the surface.

"The insect that has destroyed so much grain in past seasons is a yellow fly (with blue wings), about one tenth of an inch in length; it deposits its eggs, while the wheat is in blossom, within the chaffy scales of the flower, during the evening twilight and dark stormy days, in numbers from two to forty, which hatch in ten days and completely destroy the germ of the berry. The maggot is reddish yellow, about one sixteenth of an inch long, or perhaps an eighth when full-grown."

"It is supposed that it leaves the wheat and winters in the ground. That is the time to kill them. Salt is undoubtedly the remedy. The fly is hardly ever seen; they never fly in the sunshine. The weevil fill the air like musketoes in a swamp. This insect hides on the stems and leaves, shaded from the heat of the sun. This is a northern insect; the weevil is a southern one."

"This insect was first seen in America about the year 1828, in the northern part of Vermont and borders of Lower Canada. It first made its appearance in northern Ohio in the year 1843, and its ravages have rapidly increased from year to year."

Dr. Harris recommends brimstone fumigation of the plants. That would be impossible, almost, on whole counties. Flour of lime sown on wet wheat has appeared to prevent the work of destruction. Deep plowing the stubble, and not sowing any grain upon it next year, might eradicate the insect, if all who are affected would unite in that course, as all must in any other that should be adopted.

The remedy recommended by our correspondent in Broome Co., of salting the cut wheat in the mow or stack, would not answer, for the maggots already burrowed in the ground for winter, but the salt must be applied to the land in liberal quantities—say five to ten bushels per acre. We cut up the cut-worms effectually upon our corn ground this season with a handful of salt to a hill. The corn fired a little at first, but it is growing beautifully now. Every bug or worm can be killed in the soil, with salt, and we have no doubt that will be found the most sure way of ridding the country of this terrible pest of wheat-growers. The *Cecidomyia tritici* of Kirby is what we take to be the insect called the "red weevil."

A "close observer" of the habits of the midge, says of one who had written of the insect's wintering in the ground:

"The writer is mistaken in some of his facts as to the habits of the insect, as he can very easily satisfy himself by getting a few heads of wheat in the proper season that are affected and putting them in a small glass jar. He will see that the worm does not go into the earth, but comes outside of the head after destroying the grain of wheat it hatched in, and weaves itself up into a snug little cocoon on the under side of the outside chaff. If he examine that cocoon after a time, he will find the worm has changed into a new shape, and will ultimately come out a winged insect. I have never yet been able to find the worm seeking shelter in the earth. It is this knowledge of the habit of the insect that induces the belief that liberal salting of the grain in mow or stack is fatal to it."

Townend Glover, who is pretty good authority, says of this pest:

"The parent fly deposits her eggs in the beginning of July, and in the opening flowers of the grain, or when the wheat is still in the milky state. The eggs hatch in about eight days, when the little yellow maggots, or worms, may be found within the chaffy scales of the grain. The seed scales of grass also sometimes serve as a shelter for these depredators. The worms, which are of a bright yellow or orange color, do not exceed an eighth of an inch in length, and are often much smaller. I have seen as many as twelve within the chaff of one single grain, sent to the Patent Office from Ohio. These maggots prey upon the wheat when only in a milky state. When they begin their depredations, soon after the blossoming of the plant, they do the greatest injury, as the grains never fill out. Toward the last of July or beginning of August the full-grown maggots cease eating, and become sluggish and torpid, preparatory to shedding their skins, which takes place in the following manner: The body of the maggot gradually shrinks in length within its skin, and becomes more flattened and less pointed, as readily may be seen through its delicate transparency. This torpid state lasts only a few days, after which the insect casts its skin, leaving the latter entire, except a little rent at one end of it. These empty cases, or skins, may be found in great abundance in the wheat-ears, after the molting process is completed. Mr. J. W. Dawson, of Pictou, Nova Scotia, says that sometimes the maggot descends from the plants and molts on the surface of the ground. After shedding the skin, it recovers its activity, and writhes about at first, but takes no food. It is shorter, somewhat flattened, and more obtuse than before, and is of a deeper yellow color, with an oblong greenish spot in the middle of the body. Within two or three days after molting, the maggots either descend of their own accord or are shaken out of the ears by the wind, and fall to the ground. They do not let themselves down by threads, as has been supposed by some, for they are not able to spin. Nearly all of them disappear before the middle of August, and they are rarely found in the grain at the time of harvest. Hon. William D. Lindsley, of Sandusky City, Ohio, however, sent me several specimens of wheat with this insect in it as late as the beginning of August. From observations and remarks made by intelligent farmers, it appears that the descent of these insects is facilitated by falling rain and heavy dews. Having reached the ground, the maggots soon burrow under the surface, sometimes to the depth of an inch, those which have not molted casting their skins before entering the earth. Here they remain without further change through the following winter. It is not usually before June that they are transformed to pupæ, this change being effected without another molting of the skin. This pupa state lasts but a short time, a week or two at most, and in many cases only a few days. Under the most favorable circumstances, the pupa works its way to the surface, before liberating the included fly, and when the insect has taken wing, the empty pupa shell, or skin, will be seen protruding from the ground. In other cases, the fly issues from its pupa skin in the earth, and comes to the surface with flabby wings, which soon expand and dry on exposure to the air. This last change occurs mostly in the months of June and July, when great numbers of the flies have been seen apparently coming from the ground in fields where grain was raised the year before.

"The wheat-midge, or fly, 'is a small orange-colored gnat, with long, slender, pale-yellow legs, and two transparent wings reflecting the tints of the rainbow, and fringed with delicate hairs. Its eyes are black and prominent; its face and feelers, yellow; its antennæ, long and blackish. Those of the male are twice as long as the body, and consist of only twelve joints, which, except at the base, an oblong-oval, somewhat narrowed in the middle, are surrounded by two whorls of hairs. These insects vary much in size. The largest females do not exceed one tenth of an inch in length, and many are found toward the end of the season less than half this length. The males are usually smaller than the females, and somewhat paler in color.' Mr. Lindsley sent several of these insects to the Patent Office in August, 1855, and stated that they have been extremely destructive in several parts of his district last year (1854), and that in some places the cattle were turned into the field in order to eat the straw and what little was left of the grain, the main crop not being worth harvesting. These flies are likewise said to be much more numerous and destructive on the edges of fields than in the center, and in some cases when the edges were completely worthless, the center bore comparatively a good crop.

"Fumigation with sulphur, and burning weeds on the windward side of the field, when the grain is in blossom, have been recommended. Air-slacked lime or wood-ashes, strewn over the grain when in blossom, in the proportion of one bushel of lime or ashes per acre, to be scattered over the field when the plants are wet with dew or rain. Two or three applications have sometimes been found necessary. Plowing up the ground, also, to destroy the maggots; and the dust-chaff, or refuse straw, if found to contain any of these insects, should be immediately burned. In those parts of New England where these insects have done the greatest injury, according to Dr. Harris, the cultivation of fall-sown or winter grain has been given up, and this for some years to come will be the safest course."

247. **The Joint-Worm.**—One of the greatest pests that Virginia farmers have had to contend with in wheat-growing is the joint-worm. It has been more destructive than the weevil, and in some cases as great a pest in that State as the midge has in New York.

The following is Glover's description of this insect:

"The joint-worm (*Enrytoma hardei*), which has committed such ravages in the wheat-fields of Virginia, comes from a small, black, four-winged fly, about an eighth of an inch in length. The female lays several eggs in the outer sheath of the stalk above the joints. After they hatch, the worms commence feeding within the sheath, and the constant irritation produced by them forms a woody gall, or rather succession of galls, in the cavity of each of which lies a small, footless maggot, about the seventh or eighth of an inch in length, having a body with thirteen segments, and of a pale, glossy, yellowish color. The number of worms in each cluster of galls varies from four to ten, or even more. The substance of the stalk attached becomes brittle, and either partially or entirely fills its central cavity, and frequently distorts it into various irregular shapes. I have often observed young rootlets putting out immediately below a joint so affected. The worms on the stalks of wheat, when examined in February, were yet in the larva, but early in March several had assumed the pupa state. They were about an eighth of an inch in length, of a pale yellow color, which as the pupæ were near coming out, became afterward nearly black. These pupæ had the rudiments of wings, legs, and antennæ as in the perfect fly, but were motionless. Late in April and the beginning of May the flies made their appearance through holes gnawed through the tough, woody covering of the gall-like excrescence in which they had passed the winter. This transformation, however, took place in a warm room. These flies are about an eighth of an inch in length, of a black color, the knees, joints, and feet being tinged with yellow. The males, according to Dr. Harris, vary from the females by being smaller, and in having no piercers. The joints of the antennæ are likewise longer, and surrounded with whorls of little hairs. The hind body is shorter, less pointed at the extremity, and is connected with the thorax by a longer stem. He also says, that among fifteen females only one male was found. This corresponds with what I have observed, as out of sixty to eighty joint-worm flies, produced from diseased stalks of wheat, I only procured one male answering to his description, and eight parasites, not quite a tenth of an inch in length, of a dark metallic shade, with yellow legs, and the antennæ much thicker at the end. These flies were furnished with four transparent, dotted wings. It is somewhat incomprehensible how it happens that so many females appear at the same time without more males.

"Another four-winged fly also made its appearance from the same stalks, of about an eighth of an inch in length, with an abdomen and legs of a bright yellow. The head and thorax were of a dark color, and somewhat metallic luster. The wings were transparent, dotted, and fringed with short hairs, and the piercer reached to the middle of the under part of the abdomen. Dr. Harris states that it has been found in Massachusetts, that plowing in the stubble has no effect upon the insects, which remain alive and uninjured under the slight covering of earth, and easily make their way to the surface, when they have completed their transformation. A free use of manure and thorough tillage, by promoting a rapid and vigorous growth of the plant, may render it less liable to suffer from the attacks of the insect. It has been stated that this fly, like the wheat-midge, does more injury on the edges of fields than in the middle.

"At the Joint-Worm Convention, held at Warrentown, Virginia, in 1854, the following was recommended: Prepare well the land intended for wheat, and sow it in the beginning of autumn with the earliest and most thrifty and hardy varieties, and do nothing to retard the ripening of the crop by grazing or otherwise. Use guano or some other fertilizer liberally, particularly when seeding corn-land or stubble. Burn the stubble on every field of corn, rye, or oats, and all thickets or other harbors of vegetable growth contiguous to the crop. Sow the wheat in as large bodies and in as compact forms as practicable; and if possible, neighbors should arrange among themselves to sow adjoining fields the same year. Feed all the wheat, or other straw, which may be infected, in racks or pens, or on confined spots; and on or before the first of May carefully burn all the straw which has not been fed. The refuse of wheat, such as screenings, etc., should also be destroyed, as the pupa case is hard and not easily softened by dampness or wet."

We can add nothing to this preventive, except a recommendation to compost the refuse of the cattle, instead of burning it. Make a heap that will undergo a heating fermentation, and the eggs will be destroyed, and the manure will be more valuable than the ashes.

248. **The Hessian-Fly.**—This is the common name of an insect that at one time threatened to put a stop to wheat-growing in all the Northern and Middle States. This insect (*Cecidomyia destructor*) obtained its name from the fact of its (supposed) importation with the Hessian soldiers of the Revolution, though this fact has been strongly disputed. It might have been in

the country before, and it might also have been imported. It was first publicly noticed in 1776, at Flatbush (L. I.), and on Staten Island, in the vicinity of Sir William Howe's debarkation of those mercenaries of King George, and it was quite in keeping with the feelings of the people that they should readily credit the charge, that they had brought this among the other evils of war. At any rate, it multiplied and spread rapidly, and was for a time looked upon as a scourge almost as great as fire and sword. Of late years, however, it appears to be dying out. It is subject to the attack of parasites, which have done more than all the arts and strength of man to rid his land of this pest.

The greatest destroyer of the Hessian-fly is a shining black four-winged fly, about the tenth of an inch in length. Do not mistake this friend for your foe, and compass its destruction. Many sensible men have made this mistake, and very aptly, too; for, as they will tell you, they have actually seen the fellow come out of the dried skin of the Hessian. So they did; but not until the destroyer of wheat had been destroyed by an insect that fed upon his vitals.

The parasite of the *Cecidomyia destructor* is the *Ceraphron destructor* of Say, and it is a question of vast consequence to wheat-growers what they can do to promote the growth of this insect, which has already been of such vast benefit to them.

We have no doubt that the parasite of the wheat-midge will do the same kind of service, and perhaps exterminate that pest.

The Hessian-fly is a very small two-winged gnat. The female deposits her eggs soon after the wheat begins to grow, say in October, for lat. 39°, 40°, 41°, in the cavities between the little ridges of the blades. In from four to fifteen days the eggs hatch, and the diminutive maggots work down into the leaf-sheath and there spend the winter. The fly works from August to January, according to latitude and climate influences, so that what would be a remedy in one place would not be in another. In fact, it is asserted that the fly sometimes works upon wheat in the spring; so the following recommendation would not be effectual. That is:

About the middle of August sow a strip of wheat adjoining where you intend to put your crop—say one or two acres. About the middle of September sow your field. When that has come up and shows cleverly, plow under the first sown; turn it under well. Your fly is headed and your crop is safe.

In the particular locality of the man who says "that remedy wont fail," perhaps it will not.

The maggots within the leaf-sheath lie dormant through the winter, and do not stop the growth of the wheat until just before it is ready to blossom, when if there are several on a stalk, it withers and dies. The worms do not eat the stalk, but suck up the sap and poison it. A full-sized maggot is three twentieths of an inch long, with a hard skin, of a bright chestnut color, and looks as much like a flax-seed as anything it can be compared to. This appearance remains, but the outside is a dried skin inclosing the pupa, which advances to perfection in April or May, and it is these early flies that lay eggs upon spring wheat. It is asserted that there are three broods in a year. The fly is about the tenth of an inch long; the head, antennæ, and thorax, black; the hind body tawny, the wings tawny at the base, and black and hairy at the ends, expanding about a quarter of an inch. The legs are pale, red, or brown, and feet black. The antennæ are jointed, and surrounded with whorls of short hairs.

With the above short description and microscope in hand, it will not be difficult for any observing person to determine the character of an insect found upon his wheat, so as to decide whether it is the Hessian-fly or the Hessian-fly destroyer.

219. **Insects Injurious to Fruits.**—Probably of all the tribe of pests that infest fruit-trees, that known as curculio, or plum weevil (*Rhynchænus nenuphar*), does the most damage. It has nearly driven the plum-trees away from every farm, and has in some seasons destroyed the peaches, and done incalculable damage to the apple crop. In fact, for many years previous to 1860, there was not a good apple crop in all the Eastern States, owing, in a great measure, to the curculio. Small as this pest is, it is capable of doing great mischief to all the fruits, and its sting is death to plums, apricots, and nectarines, and very injurious to cherries and pears. The finer the fruit, the greater the injury. A very hardy plum or cherry may survive a sting from this insect, which leaves a peculiar, crescent-shaped wound, and makes an ugly scar and a hard gnarl in the fairest fruit.

This insect is found in nearly all the States of the Union; it is worst in the Middle ones, or between latitudes 39° and 41°.

By the following minute description by Glover, the little villain may be known by any one, though not previously acquainted with him:

"The perfect curculio is about two tenths of an inch in length, of a dark brown color, with a spot of yellowish white on the hind part of each wing-case. The head is furnished with a long, curved snout, or bill, with which it is enabled to bore into the unripe fruit by means of jaws placed at the end of the bill. The wing-cases, which are rigid, uneven, and humped, cover two transparent wings, by which the perfect weevil is enabled to fly from tree to tree; but when these wing-cases are closed, the back appears without any suture, or division, which has led to the very erroneous idea among farmers that the insect can not fly. When disturbed, or shaken from the tree, it is so similar in appearance to a dried bud, that it can scarcely be distinguished, especially when feigning death, which it always does when alarmed. As soon as the plums are of the size of peas, the weevil commences the work of destruction by making a semi-circular cut through the skin with her long, curved snout, in the apex of which she deposits a single egg. She then goes to another plum, which is treated in a similar manner, until she has exhausted her whole stock of eggs. The grubs, which are hatched by the heat of the sun, immediately eat their way to the stone in an oblique direction, where they remain, gnawing the interior, until the fruit is weakened and diseased, and by this treatment falls from the tree. The grub, which is a small, yellowish, footless, white maggot, then leaves the fallen fruit, enters the earth, changes into a pupa, and in the first brood comes to the surface again, in about three weeks, as a perfect weevil, to propagate its species and destroy more fruit. It has not yet been decided whether the latest generation of the weevil remains in the ground all winter in the grub or in the pupa state. Dr. E. Sanborn, of Andover, Mass., asserts, however, that the grubs, after having entered the earth, return to the surface in about six weeks as perfect weevils, which must remain hidden in crevices until spring. The most popular opinion is that they remain in the larva or pupa state in the earth during the winter, and only reappear in the spring in the perfect state. The worm, or grub, is often found in the knots or excrescences which disfigure and destroy plum-trees, and has been wrongfully accused of being the cause of these swellings; but it is highly probable that the weevil, finding in the young knots an acid somewhat similar to that of the unripe fruit, merely deposits its eggs therein, as the nearest substitute for the real plum.

"Some of the remedies recommended for preventing the ravages of these insects are actually absurd, such as tying cotton round the trees in order to prevent them from ascending, when it is known that they are furnished with wings, and fly from tree to tree with perfect ease. Among the remedies at present in use, one is to cover the fruit with a coating of whitewash mixed with a little glue, applied by means of a syringe. Another is to spread a sheet upon the ground under the tree, and then jar the principal branches suddenly with a mallet covered with cloth, so as not to bruise the bark, when the perfect insects will fall into the sheet and feign death, and may be gathered and destroyed. Hogs are sometimes turned into plum orchards, where, by eating the fallen and diseased fruit, they materially lessen the evil. Coops of chickens, placed under the trees, have also been recommended. Then shake the trees often, and the chickens will catch and devour the insects. All fallen fruit should be gathered up several times in the course of the season, and burnt, or given to hogs, or destroyed in some other way."

We shall now give, besides the above remedies, a few more, "infallible," of course, that float annually through the newspapers.

250. **Curculio Remedies.**—To one pound of whale-oil soap add four ounces of flour of sulphur. Mix thoroughly, and dissolve in twelve gallons of water. To one half peck of quick-lime add four gallons of water, and stir well together. When fully settled, pour off the transparent lime-water, and add to the soap-and-sulphur mixture. Add to the same, also, say four gallons of tolerably strong tobacco-water. Apply this mixture, when thus incorporated, with a garden-syringe, to your plum or other fruit trees, so that the foliage shall be well drenched. If no rains succeed for three weeks, one application will be sufficient. Should frequent rains occur, the mixture should be again applied until the stone of the fruit becomes hardened.

The person who used and recommended this remedy says: "The trees that received the application ripened an abundant crop of as perfect and beautiful plums as ever grew, while not a single plum was ripened on those trees to which the wash was not applied."

He also recommends a little salt to be added to the mixture.

It has been stated as an important fact, that plum-trees planted in such a position that the fruit will hang over water, will never be stung by curculio; so that nothing is more easy than growing this delicious fruit wherever the trees can be so planted. Dr. Underhill, of Croton Point Vineyard notoriety, states that he is never troubled, not having seen an insect upon one of 150 trees in six years. He formed an artificial pond, with banks constructed on purpose to set the trees slanting over the water. He gathers the fruit in a boat. He has many of the best varieties of plums so planted, and never saw finer fruit than he thus produces. It is an experiment that should be tried by every man who has the necessary conveniences. The ravages of the curculio have been so great for many years that we have had but few plums, and those inferior and high priced, in this market.

We have the following account from James Taylor, of St. Catherine's, C. W., a few miles from Niagara Falls, of a pretty effectual remedy for the great pest of the plum-grower—the curculio. He says:

"Our locality being much infested with the curculio, and observing in one paper issue, last spring, what had been pronounced by a Mr. Jos. H. Mather, of Goshen, twenty miles southeast of the place where the writer resided, an effectual remedy against its ravages, allow me, for the benefit of your readers, to state *my experience of its efficacy.* The proposed remedy was a mixture of sulphur, lard, and Scotch snuff, to be rubbed freely on the trunk and branches. This I applied according to the directions, and it is true that I had a splendid crop of plums, some of the choicest varieties, always most subject to the attacks of this insect, viz., the Bolmar, Huling's Superb, etc., being perfectly loaded; *but mark the result.* On examining my trees last fall, *I found all that I had applied the mixture to in a dying state*, and I have lost them all, with the exception of one or two young trees. The operation being rather a troublesome one, I did not apply it to as many as I should otherwise have done, or I should have lost more. So much for quack nostrums. The remedy proved worse than the disease. Perhaps my experience will be useful to others."

R. G. Pardee gives the following remedy for the curculio, which has been successfully practiced by a person of his acquaintance. Take fresh cow-droppings, and a little wood-ashes, some lime, and a little sulphur, and make all into a thin decoction, and throw it over the trees with a hand-basin. This lasts until it rains; it is then put on again. A half pound of sulphur to a half barrel is sufficient, and of the other substances it is not very important as to the proportions.

We think the labor of this application would be too great.

Dr. Trimble, of New Jersey, says that he has tried all sorts of offensive odors to keep off curculio, without effect. "I have found no remedy equal to that of manual labor in catching and destroying the insect. It is a fact that some plum-trees are not infested by the curculio."

The following is a conversation of some experienced fruit-growers upon curculio remedies, and the character of the insect:

HENRY STEELE, a New Jersey nurseryman, said that he had prevented curculio by the use of black soap from the tallow-chandler's, dissolved in water and much diluted, with which the trees are syringed directly after the blossoms fall, after a rain, and repeated, if necessary, in consequence of being washed off.

R. G. PARDEE—A person present assures me that a neighbor of his yarded his hogs around his plum-trees, and that saved them from the curculio. Mr. Pardee said that he thought that fresh cow or pig manure, dissolved, and the water sprinkled over plum-trees, would prevent curculio. They dislike any strong-smelling substances.

WM. LAWTON—You may apply cow or pig manure raw to all fruits and berries, but not horse manure; that never should be used fresh—make it first into compost.

Dr. TRIMBLE—The curculio has already commenced its ravages this spring. I am also satisfied that the curculio stings the bark of plum-trees and produces the disease known as the black knot. I have made a great many experiments to prove the insect identical with that which destroys all of our smooth-skinned fruit. The jarring of trees to shake off the curculio is effectual, but it is an immense labor, as it must be attended to every day, and some sunny days several times a day. I think that, unless some remedy for this insect can be discovered, we shall be unable to raise any fine fruit. It is the curculio that causes the disease in apples known as gnarly. We get no good apples in Jersey, and it is out of the question to raise plums, apricots, or fine peaches. We import prunes from Germany cheaper than we can make boxes to pack them in—the plums grow to such perfection in that country.

WM. LAWTON—I have removed bushels of black knots from my cherry-trees and burned them. I found in all these knots a living worm. I destroy the common caterpillar by collecting them in the nests and destroying them.

Mr. O. W. BREWSTER, of Freeport, Ill., gave a statement of his success in repelling the attacks of the curculio on his plums. Early in spring he scattered lime, which had been mixed for whitewashing, under his plum-trees once a week, until the curculio quitted the field. He also scattered soap-suds and chamber-lye under them in liberal quantity. He said, I have twice tried the same remedy, with complete success. I once applied it to a small tree, which matured its whole crop; several other trees near it, which set full of fruit, did not ripen a specimen. If plum-trees succeeded with us well, I should have no fears of the curculio.

P. H. PERRY, of Collins Center, N. Y., says:

"A gentleman lately informed me that he had raised a good crop of plums simply by spreading a heavy coat of fresh horse manure on the ground under his trees. He said it entirely prevented the ravages of the curculio, when on their account he had not been able to gather a crop of plums for years before."

SOLON ROBINSON read the following letter from Dobbs' Ferry. The man certainly can read, at least he says so, but we wonder how he can own a tree liable to the attacks of the curculio, and know so little about it. He says:

"I have been much interested in the doings and sayings of the Farmers' Club, but in the various debates before that body, I have seen no statement advanced concerning the habits of the curculio. I have also read several articles concerning its depredations, but I have yet to learn whether it is a flying insect, or simply crawls up the body of trees. I have several cherry-trees in my garden of choice varieties, and I can safely say that every cherry was punctured by the curculio this spring.

"The trees are growing and have just commenced bearing.

"The soil is sandy.

"My neighbor, less than a hundred feet from me, has escaped its ravages.

"Does it fly or crawl?

"Would a barrel or trough similar to those used on the elms of New Haven be of any service in staying its ravages?

"Are the worms in the common black cherry, which is universally inhabited, produced by the curculio?

"Is there any remedy for this pest?"

That question—"Is there any remedy for this pest?"—has been answered in every agricultural paper in the world, and so it has been stated that the insect has wings, and yet the writer of this letter has not read of it.

Let me ask another question: "How is it possible to enlighten people who will not read? or, reading, will not understand?"

Dr. TRIMBLE—I am now trying several experiments to prove that the same insect that stings the fruit makes the knots on the limbs. No attachment to the bole of a tree can be any protection against a flying insect like the curculio. The excrescence on the limb is no more remarkable than the insect that produces the balls upon oak-trees. Dr. T. showed specimens of the curculio of plums, that he had hatched out in earth covered to prevent escape, to show that the insect becomes perfect from the first laying of eggs in young plums, and, as he thinks, these perfect insects lie dormant till spring. The question is, Where do they hide themselves until the young fruit is ready for them to deposit their eggs?

Prof. MAPES said that a preparation called Persian Powder is said to be very effectual in destroying insects.

WM. S. CARPENTER thought that no bug-powder would rid a farm of caterpillars. Something else must be done.

WM. LAWTON said that he had cleared his farm of tent caterpillars by pulling down the nests by hand, with all the worms in them, when they are easily destroyed.

Dr. TRIMBLE gave a history of the cockchafer, which remains in the ground, like the locust, four years, and then comes forth in immense numbers, but in the flying state. They do not feed, and consequently do no damage to plants.

In our opinion, the best remedy for curculio is pigs, poultry, and birds. We have seen fine crops of plums grown in a curculio neighborhood, in a season when these pests were active, in a small lot occupied as a poultry-yard, in which several pigs run at large. The hens scratched, and the pigs rooted the ground, and the dove-cot also had something to do with the matter. At any rate, the barn was inhabited by swallows, and they catch flies, and perhaps curculios.

251.—**Apple and Peach Worms.**—The codlin moth, or apple moth (*Carpocapsa pomonella*), is the name of an injurious insect which deposits its eggs, in June or July evenings, in the calyx of the young apples, where they soon hatch, and the little worms eat their way to the heart of the fruit, where they continue till ready to change into the chrysalis state. "Wormy apples" generally ripen prematurely and fall. The worm is of a reddish color when fully grown, and ready to leave the fruit and creep into crevices of the bark to spin a semi-transparent cocoon, where it changes into a small chestnut-brown chrysalid, and that produces a moth in a few days, measuring seven tenths of an inch across the wings, which are of a brownish-gray color, crossed by many dark-colored lines, with a dark, oval spot on each wing. The under wings are lighter colored, shaded near the margin. As a remedy against this pest, it has been recommended to wrap cloths loosely around the forks of the trees, for a shelter for the worms to form cocoons, and then destroy them. We fancy that this remedy will cure but a very small part of the evil. Picking up and putting all wind-falls where the worms can never see daylight will kill more of them.

Perhaps the best remedy for this, and many other little pests, is the Scriptural one—"Dig about the tree and dung it." That is, give it greater vigor of growth; make it more productive, so that a portion of the fruit will come to maturity in spite of all insects. It is a well-known fact that the most vigorous-growing, thrifty trees exactly correspond with thrifty farmers—the more they have, the more they gain. Insects mostly attack the most neglected trees.

252. **Peach-Tree Borers.**—The peach-tree borer (*Ægeria exitiosa*) is one of the greatest pests of the farm, because it has almost blotted out of existence this most valuable fruit in large districts of the country. It is believed by most careful observers to be the cause of nearly all the diseases which affect the peach-trees, the most visible of which is "the yellows," where the leaves gradually take on a yellow, sickly appearance in midsummer, and frequently at the age of three or four years show scarcely a green leaf, when they should be clothed in the richest green, and finally wither and gradually perish. The epitaph of tens of thousands of peach-trees all over New England, New York, New Jersey, and Delaware, Maryland, and Pennsylvania,

would be, "Died young—attacked by borers—the disease exhibited in yellow leaves—speedy death followed."

This boring worm is produced from eggs deposited at the foot of the tree by a wasp-shaped moth, of a steel-blue color, with an orange ring about the abdomen. Sometimes the eggs are placed in wounds, or between forks, but generally in the bark, close to the ground, where the worms can easily penetrate into and devour the inner bark and wood just below the surface.

Sometimes a vigorous tree will retain life year after year, with these worms gnawing at its vitals. Sometimes the tree is girdled and destroyed in a single summer. There appears to be a succession of broods in a single season. In the latitude of New York city, the moths come out in June and July. Nectarines and apricots are also attacked by the same insect. The plum wood appears too hard, and peaches engrafted on plum stocks sometimes succeed where, if upon their natural roots, they would never bear fruit. These borers, when full-grown, are about an inch long, colored yellowish white, with an amber-brown head. The chrysalis is brown; it is formed in a case made of the gnawings of the worm, which it glues together around its body. The moth expands wings an inch across, transparent and veined, and bordered blue in the male, and dark blue upon the female's upper wings, and her body is belted with orange.

The remedies, as preventives or cures of the peach-tree borer, are numerous. Dr. Harris, the great American entomologist, says:

"Remove the earth around the base of the tree, crush and destroy the cocoons and borers which may be found in it and under the bark, cover the wounded parts with the common clay composition, and surround the trunk with a strip of sheathing-paper nine or ten inches wide, which should extend two inches below the level of the soil, and be secured by strings of matting above. Fresh mortar should then be placed around the root, so as to confine the paper, and prevent access beneath it; and the remaining cavity may be filled with new or unexhausted loam. The operation should be performed in the spring, or during the month of June. In the winter the strings may be removed, and in the following spring the trees should again be examined for any borers that may have escaped search before, and the protecting applications should be renewed. The ashes of anthracite coal have also been recommended to be put into the cavities made when the earth has been removed from around the trunks when searching for the worm; and if the trunks are thoroughly searched three or four times a year, especially in the earth near the roots, and the grubs and chrysalids dug out and destroyed, these insects would soon cease to be as injurious as they are at present."

The following conversation in the Farmers' Club conveys some useful information upon this important subject:

SOLON ROBINSON read a letter from the Rev. J. S. Weishampel, Sen., Baltimore, Md., upon the use of hot water to kill insects upon trees. He alludes to a letter read here some weeks since, about scalding wheat, and then says:

"This scalding process destroys the egg of the fly, and the same process has been known to destroy the eggs as well as the grubs themselves, that injure the peach, plum, and other trees so greatly. Scald the stem of the tree well, letting the hot water get well into the ground around the tree, where the grubs do the most harm, and a destruction of both eggs and grub follows; and, in addition to this, the scalding appears to add to the vigor of the trees.

"An old lady in Berks County, Pa., had a plum-tree that for many years bloomed and brought forth crops of fruit till half ripe, and then shed them. She often besought her husband to remove the tree, but he still pleaded, 'Let it stand another year.' At length, one spring, after she had boiled her soap, she heated the kettle full of the refuse lye to a boiling degree, and poured it all down the stem of the tree, intending to 'scald it to death,' as she said. It soon blossomed most abundantly, and bore a profuse crop of plums, which it brought to the greatest perfection, which greatly pleased the old lady.

"This same principle could be applied to the destruction of every kind of destructive insect upon the various choice fruit-trees, either by pouring boiling water upon the limbs and stems, or by conducting a stream of steam through a hose or pipe, from a movable boiler, to kill both eggs and insects.

"Chestnuts, too, are very liable to be worm-eaten. If they were subjected to a momentary heating (wet or dry heat), to a sufficient degree to scald, it would kill the germ of the worm that destroys that sweet nut. And the same principle would also prevent all wood used in building and machinery from becoming worm-eaten."

Prof. Mapes—I have used it on peach-trees, until I have satisfied myself that a peach-tree can not be injured by hot water.

Mr. Carpenter said that lime was the best thing he ever tried around peach-trees.

Mr. Wheeler said that lime will not kill the grubs in the wood.

Mr. Smith, of Connecticut—I have found no remedy except manual labor, though wood-ashes are valuable, and so is lime. I have an orchard in full bearing that is fourteen years old.

Prof. Mapes—I have never found any remedy equal to hot water. It cooks the worms.

A letter from East Wilson, Niagara County, N. Y., says:

"A large and interested community, comprising at least *five thousand* peach-growers in this county, ask for *light*. What can be done to stay the ravages of the red-headed *peach-grub?* To dig him out and kill him will only insure an armistice for about ten days. Fresh wood-ashes applied to the trees only seem to sharpen his appetite for destruction. Hundreds of orchards and thousands of trees are dying from his operations. There are half a million of peach-trees in this vicinity suffering from this pest. Will tar prevent his operations? and will it injure the tree? Can you or any of your numerous readers or correspondents tell us of any specific which will kill the grub without injuring the tree? If you can do so, you will confer a substantial favor upon many hundreds of your readers."

ANDREW S. FULLER—The best remedy is to preserve the birds—the natural insect destroyers. It is their decrease that has increased destructive insects.

WM. LAWTON stated that he had taken great pains to preserve birds around his place, and was now reaping the benefit. As to any outward application to kill the peach-worm, he did not know of anything that would destroy it without destroying the trees. If the worms are dug out, and a plaster of soft cow-manure is applied, the tree may recover. It is a very tedious operation.

Wrens.—The Secretary advocated the cultivation, or rather protection, of wrens and insect destroyers.

Mr. FULLER said that the wren was a mischievous bird, and destroyed the eggs of other birds.

A letter from P. M. Goodwin, Kingston, Luzerne County, Pa., says:

"I observe in the transactions of the Club of July 2, it is thought that if a discussion of the topic of the peach-grub would elicit a remedy, it would be universally entertaining. My conclusion is, that trying to cure the peach-grub, unless where the soil is light and but few are found, is a humbug. I have a preventive, which I will give cheerfully:

"When I purchased my little place on Rose Hill, overlooking a portion of 'Wyoming Valley,' there were one hundred neglected peach-trees thereon—budded, and of excellent varieties—which were full of grubs. Early in April I commenced operations by carefully clearing away the grubs by means of the knife and wire. I then made a funnel-shaped hole around the base of each tree, which would hold three or four quarts of water. I filled the holes with boiling water, which effectually destroyed the progeny. I then filled the holes with a tenacious clay, and tamped it hard, leaving the surface around the tree cone-shaped and hard compacted. I have examined these trees at various times during the intervening five years, and have found but one tree affected, and that with but two grubs. This mode, with me, has acted as a perfect preventive, and, I have no doubt, will with all who adopt it and exercise the same care.

"These trees were three or four years old, and, at the time the experiment was made, much inferior to some from the same lot growing elsewhere, which were regularly examined and carefully cleared of grubs in the usual way. My trees are sound in wood, and look well, while the others have disappeared.

"In planting peach-trees now, I would cut away the tap (not top) root close under where the horizontal roots put out. Having driven a stake firmly for each tree, I would plant it so shallow that after the heavy rain the upper side of the roots will become exposed. In this way the trees are not so liable to become infested with the grub. I planted some trees so a year ago, and find the non-appearance of the grub satisfactory."

R. G. PARDEE—I have tried the hot water very often, and have always found it effectual; and I thought that by this time everybody had heard of it, but if they have not, I hope this letter will be read and remembered. Instead of clay I used leached ashes, as they were more convenient, and they answered a good purpose.

The Chairman presented a new pest of the peach—a dark-colored worm, about an inch long, that fixes itself in the foot-stalks of the leaves and destroys them.

WM. S. CARPENTER—This insect discussion is one of great importance to farmers. These little, insignificant things are great destroyers of our crops. What if we could discover a remedy for the bugs that eat up the potato vines, or a remedy for the effect of cold upon fruit-trees; for I have noticed, within a day or two, that the northerly sides of the pear-trees are blasted and turned dark by the cold wind. The cold of a day or two in spring often destroys many tender vegetables.

It was observed that cold nights sometimes have a beneficial effect upon fruits, by destroying some of the insects that usually prey upon them. It did in the spring of 1860. That season proved the most productive of fruit of any year in the memory of most young people. Of the hot-water remedy for the peach-grub, we speak from experience, that it is the best of all we ever knew. Lime, too, has been tried with good results. Hon. John M. Clayton, of Delaware, assured us once, at his house, that the peach-trees we were then looking at, which were so vigorous, had been treated with half a bushel of lime, placed in contact with the body and upper roots, and he believed it would continue to be a preventive of the peach-grub.

253. **Insect Remedies.**—We give the following various remedies for insects, all of which are vouched for by good men; some believing one infallible, and some another.

The following wash is recommended for all sorts of trees, as a preventive remedy against caterpillars, etc.: Potash, 20 lbs.; air-slacked lime, half a bushel; sifted wood-ashes, half a bushel; fresh cow dung, half a bushel. Mix in water enough to be of the consistence of whitewash. Scrape off the rough bark, and rub the wash in well with a brush.

Caustic soda wash is one of the best things we ever saw applied to a fruit-tree. It will make the bark as smooth as if wax-polished. It leaves no harbor for insects under pieces of dead bark. It is made by heating the common sal-soda red hot in any old iron vessel, and then making a lye of it —say about one pound of the salts to a gallon of water—and washing the trees with a brush. It is best to put it on in the spring. A piece of old stove-pipe, battered up at one end, and stuck into one of the stove-holes, answers very well to heat the soda in. The wash should be too caustic to put your hands in, and, while putting it on, it will not be worth while to wear a fine broadcloth coat.

The Liquid Brimstone Remedy.—M. Letellier states in the Journal of the Paris Horticultural Society, that a liquid formed by boiling 63 grains of red

American potash, and the same quantity each of flour of sulphur and soap, in $1\frac{3}{4}$ pints of water, is most excellent and efficacious in destroying insects. If it requires to be stronger, the quantity of potash and sulphur may be doubled, but the soap must remain the same. Upon immersion, the insects —ants, caterpillars, cockchafers, grubs, etc.—are instantly killed, while the solution occasions no injury to plants. The liquid will destroy ants and grubs when poured into their places of resort.

Preventive of Canker-Worms from Apple-Trees.—A letter from Malden, Mass., gives a most sensible plan for a cheap preventive of canker-worms, which climb the boles of apple-trees:

"Take pine boards of suitable width for four to box a tree. Cut them in pieces two feet long on one edge, and four feet long on the other edge. Nail them together in a box around the tree, with four sharp points up. This box is to be adjusted about the tree before the grubs come from the ground, and a peck of powdered lime or ashes thrown between the trunk of the tree and the inside of the box. The caustic lime or ashes will destroy the grubs near the tree, and the boxes will invite all the grubs near them to ascend and deposit their eggs. I found the pinnacles covered with grubs and eggs, and the insects apparently contented with this highest point as a safe place, and there the eggs were deposited. I then removed the boxes to a considerable distance from the trees, and heard no more from canker-worms; they all died for want of proper food."

Another plan, lately patented, to prevent worms climbing trees, looks as though it would be effectual. A tin trough is made in two parts, large enough to encircle the tree and leave a space four or five inches between the trough and bole of the tree. From the outside edge of the trough a strip of cloth extends all around, wide enough to have its upper edge tacked to the tree, by which the trough filled with oil is sheltered from rain and sustained in its place, so that worms creeping upward come first in contact with the cloth, and if they crawl down that to get around the edge and so up the tree, they are caught in the oil, which, being sheltered, remains in good condition longer than when exposed. Now it is an experiment worth trying, and for which there is no patent, whether a strip of cloth nailed around the tree at one edge, and having the other extended six inches from the bole by a wire or limber rod, would not answer the purpose without the oil-trough. The under side of the cloth could be coated with some kind of pitch that would not harden soon, being protected from sun and rain, which would effectually prevent the ascension of insects—certainly much more so than the belt of tar as it is usually applied.

Dr. Trimble, in answer to the question, what remedy to apply to this pest, said that the only remedy is the ichneumon parasites. These, in their proper time, will attack the worms and destroy them. In the mean time, while one section of the country is ravaged, another is extraordinarily fruitful.

He introduced specimens of the caterpillar that preys upon the grapevine, to show that it has its parasite, one of which had just emerged from the body of the caterpillar. This, he hoped, would prove a sufficient check to the ravages of this particular pest.

254. **Another Conversation at the Club about Insects.**—WM. S. CARPENTER—All classes of insects have their favorite plants, but if these favorite plants fail, the insects will take to others. Last year I saw ailanthus trees in this city completely covered with a worm known in the country as the canker-worm. The trees were wholly stripped of foliage. We are continually importing insects in various ways. I am told that every banana stem contains a worm, and some of the same sort of worms have been discovered preying upon the quince.

The rose-slug is easily killed by hand in the after part of the day, by an application of quassia decoction, sprinkled upon the leaves, as the slugs are then on the upper surface.

Extra cultivation, by which the plants grow rapidly, is the best remedy for squash bugs.

Mr. PARDEE said that the best remedy is to expose the soil dug from a deep hole several days to the sun, and then put it back in the hole, patting it down solid, and then putting in the seed, and covering it lightly, and then spreading fine charcoal over the hill.

Mr. FULLER—I tried this charcoal remedy, last year, most thoroughly, without deriving a particle of benefit.

Mr. PARDEE—I have used charcoal, and was not troubled with bugs. Now it is possible that, without it, the plants would not have been troubled. So, after all, it is uncertain whether the charcoal was the preventive, or whether there were no bugs to be eradicated.

Mr. GARVEY—I have tried a great many remedies, and have never found anything so good as careful watering, and hand killing the bugs.

R. G. PARDEE—I wish every man would try the solution of aloes—two ounces to the gallon of water. It is such a bitter vegetable that it is offensive to all insects. It may be used just as strong as it can be made—from one fourth to a whole pound to the gallon.

Mr. CARPENTER—The canker-worm, in the northern part of Connecticut, is now ravaging the orchards to an extent that is destructive to all prospects of fruit. On some large orchards there are no apples—in fact, nearly all the foliage of the trees has been destroyed. Can this be prevented?

Washing Insects from Fruit-Trees.—Mr. PARDEE read a letter from Charles Lincoln, of North Bridgewater, Mass., which stated that he succeeded in saving his plum-trees, last spring, from insects, by washing them frequently with clear cold water, using for the purpose a little hand instrument called the "hydropult."

Dr. TRIMBLE contended that all the rot in plums is caused by the sting of the curculio.

Mr. PARDEE thought that this statement was incorrect; that plums frequently rot where there are no curculio. He said, thirty years ago, at Seneca

Falls, there was no curculio to disturb the plum, and we grew great crops, and sometimes nearly all on a tree rotted, almost all at once.

Geisharst's Compound for Insects.—P. B. MEAD (editor of the *Horticulturist*) said that he has tried the above compound upon several kinds of insects, and found it sure death to all he had applied it upon. The objection to it is its high price—too high for common use; if it would rid us of the curculio, it would make the plums too costly.

JOHN G. BERGEN—It is a fact that we have a prospect this year of a larger crop of plums than we have had in many years, and therefore persons should be careful of their hasty conclusions about this or that nostrum driving them off.

MR. MEAD—The preparation I mentioned, dissolved in water and used as a syringe upon plum-trees, had the effect to drive off the curculio, even upon one side of a tree, while the other was still infested.

Remedy for Rose-Slugs.—GEO. H. HITE—I have found an effectual remedy against the depredations of these pests, in sifting dry dust upon the bushes. It is just as good as snuff, or any other bug-powder. Of course, it wants frequent renewal.

Bark-Lice.—ANDREW S. FULLER—If a tree is properly cultivated, it will grow so vigorously that it will outgrow all bad effects from attacks of plant-lice.

Worms Destroying Gooseberry Bushes.—R. Dixie, of Painesville, Ohio, inquires for a remedy for a pest upon his gooseberry and currant bushes. He says "they have been stripped of their leaves entirely, in one summer, by hosts of green caterpillars or worms about an inch in length—a number of broods during the season. What shall we do to get rid of the pests? I have used lime in powder, and dry unleached ashes, without any apparent beneficial effect."

SOLON ROBINSON—I would try the new preparation of "attenuated coal-tar," which we have had exhibited here in the form of a dry powder. So far as I have been able to try it, I have found it particularly offensive to all insects.

A. B. DICKINSON—If soft soap is placed in the crotch of a tree, and left to work down by the rain, it will keep off all insects, even the curculio. Many insects are kept away by offensive smells, which do not kill them. Smoke, for instance, keeps off many insects.

Pests of Grapevines and other Plants.—DR. TRIMBLE—Here is a specimen of the insect that curls the grape-leaf. Spring is the time to look after them, and pick them off by hand and destroy them, or they will destroy the vines. Here is another curious insect that infests the currant bushes. It is what we call lice, and these lice furnish food for a colony of ants, by their exudation of a sort of sweet substance. Here is the worm that curls the currant-leaf; and here is another curious insect that binds itself up in a web and a leaf, and what is remarkable, this insect is itself full of other insects—parasites that live upon, and in a great measure destroy it. I wish that some parasite could be found to destroy the curculio. Perhaps it may be destroyed in time, as the Hessian-fly has been.

The Measuring Worm.—SOLON ROBINSON—If any one desires to extirpate the worms that infest the trees in our parks, now is the time to do it by destroying the eggs. Scraping and washing with potash is the best protection of the boles of the trees. If we had plenty of birds we should get rid of the worms. It is only in cities, where there are so few birds, that these pests are so troublesome. Insects are the natural food of all birds. Even the domestic ones that we keep about our homestead destroy untold quantities of pestiferous insects that could not be got rid of in any other way. The greatest profit in keeping poultry is the good the animals do in their incessant pursuit of bugs and worms, which, if not destroyed, would in their turn destroy the food-plants that we cultivate. I know of no contrivance of man that will protect him from insects.

Mr. PARDEE—In New Haven, trees have been protected by zinc troughs, filled with oil, around the boles.

Destroying Trees to Get Rid of Worms.—ANDREW S. FULLER stated that the worms in Brooklyn were so bad that the city councils were talking of cutting down all the trees in that city, to get rid of the worms.

SOLON ROBINSON—They had better cut down the boys who destroy the birds.

More than forty years ago, the "canker-worms" were terribly destructive, for several years, of apple-trees in Connecticut, and attempts were made to prevent their ravages by making a band of tar, two or three inches wide, around the bole of the tree. It proved effectual while the tar was soft; but, unless renewed every day, and sometimes twice a day, the surface dried so that the worms crawled over; and I have seen them so thick that they crawled into the tar and stuck, and then others went over them, and so on until they formed a bridge, and thus defeated their strong opponent.

Dr. TRIMBLE—The lindens of New Jersey, in former years, have been very much affected, but this year they have not been injured. I believe the insect has been destroyed by parasites, and I hope it will be in Brooklyn. I hope that no one will think of cutting down trees to get rid of the worms.

Origin of "Bug-Powder."—The Secretary stated that Lyon, the great bug-powder man, has gone home to Europe, worth an immense sum, and it is now published that the powder is made of a common French field-plant of a species of the chamomile.

All the effective insect powders now offered for sale owe their efficiency to *red chamomile.* It is sold by some of the druggists. Rub it to a fine dust, mix it with some cheap divisor, and it is the best insect powder known. When dusted into the cracks and corners of ceilings, etc., out walk the cockroaches and all other intruders without fail. Dust the affected plants, and you may keep them clear of insects.

Mons. Radiguet states to the Society of Agriculture, Paris, that the plant known as "Whiteflower Margaret" (*Chrysanthemum cuanthemum*), used as a decoration, is very destructive to insect life. This plant is not a native of this country, but is cultivated here, and can be easily multiplied.

Disease of the Coffee-Tree.—Dr. Montague stated, at a meeting of the Society, that a disease has attacked the coffee-trees of Ceylon, similar to the oidium of the grapevines. The same disease has been observed in the West Indies. Olives and mulberries are attacked; insects are observed upon them, something like the cochineal insect. There is also an exudation of a sweet gum that attracts insects. Milk of lime and purin—an extract of manure—are used as a preventive.

Ailanthus, as a food for silk-worms, has been used in France with success.

Kerosene Oil for Insects.—Wm. G. Le Duc, of Hastings, sends us a remedy for caterpillars and other insects, easily applied. It is kerosene oil. He says:

"Finding some large nests of caterpillars on my plum-trees, I took a can of illuminating oil, as it is called, and applying a few drops (sufficient to saturate the web of the nest), found that it worked like a charm. It is instant death to the vermin. Care should be taken not to apply it to the leaves of the plant or tree, as they will be scalded at once. I have but little doubt that, in the hands of your careful experimentalists, it will prove of value. The coarser oils of coal will no doubt be equally efficacious in many instances. I may as well mention here, also, that I have found kerosene oil a most excellent diluent of printers' ink, which I use in my flouring-mill for stencil-plate marking. It would be a thorough cleanser of type, though, perhaps, not so cheap as potash."

Coal-Tar for Insects.—Prof. MAPES—We are very free of destructive tree insects, this year (1860), in New Jersey, but have a fair show of other pests of the farm and garden, and we are obliged to resort to some remedy. We can not grow early turnips without using something to keep the insects off, and I am glad that the necessity stimulates invention to assist farmers in the destruction of these pests. I have lately tried one called "attenuated coal-tar," and find it effectual. It is likely to be a very valuable aid to fruit-growers and gardeners. It is in the form of powder, and wherever sprinkled upon insect-infested plants, the insects leave at once. It is coal-tar mixed with some substance so as to retain all its odor, and yet remain in the form of a dry powder.

Mr. LAWTON—The Black Tartarian is a good sort of cherry, but I prefer the Black Eagle; it is a very hardy variety, and very productive. The English Morello is an acid cherry, and the tree very free from insects. We have not had a rose-bug with us this year.

SOLON ROBINSON stated that, only five miles from Mr. Lawton, the rose-bugs infested his cherry-trees by myriads, destroying more than half the fruit. Mr. R. inquired of Mr. Lawton what it was that ate his cherry-leaves, if it was not rose-bugs, as they were evidently eaten by some insect, and if coal-tar or anything else will prevent their ravages, it should be extensively known.

Whisky for Ants.—Wm. Davis, of Marengo, Morrow County, Ohio, offers the following plan for protecting fruit-trees from ants, which, he says, have killed many trees for him. It is the same plan pursued in this city to make loafers, and then get rid of them—that is, feed them with whisky and make them drunk, and then wipe them out. He says:

"Mix whisky, molasses, and water, in equal parts, and fill a tumbler about two thirds full, and set it partly in the ground at the foot of the tree infested by ants. When it gets full of the drunkards, scoop them out and kill them."

We suggest feeding them to fowls.

Do Worms Rain Down?—A person at Angola, Ind., who notices that the Club talks about all sorts of miscellaneous matters, wants us, in the absence of more important questions, to talk about this: "Do fish, worms, and small toads, such as are often seen after a shower, in places where it appears they must have fallen with the rain, actually come from the clouds?"

Dr. Waterbury replied—They do not; it is one of the popular errors which are so hard to eradicate.

The Locust Question.—A long discussion ensued upon the locust question between Professor Mapes, Professor Nash, Wm. Lawton, Wm. R. Prince, Dr. Trimble, and Andrew S. Fuller, about the habits of the seventeen-year locust, which appeared in great numbers in the summer of 1860, in the vicinity of New York. Every schoolboy of any pretension should read all about these locusts, and study their natural history. Wherever they appear, try to learn their habits, and whether they do injury to plants, either above or below the surface of the earth.

Prof. Mapes exhibited the effects upon branches punctured by the females to lay their eggs, he still thought without permanent injury to the trees.

Wm. R. Prince declared the whole theory of the seventeen-year locusts a humbug.

Prof. Nash thought they return in some localities in thirteen years, and inquired if the nature of the soil had any effect upon their maturity.

Varieties of the Locust.—Andrew S. Fuller—We have many varieties of what are called locusts, among which are the *Cicada Septemdecim*, *Cicada Canicularis*, *Cicada Rimosa*, *Cicada Marginata*, *Cicada Superba*, *Cicada Robertsonia*, and perhaps several others. The habits of these are well known, and have been for many years. The seventeen-year locust has appeared regularly every seventeen years for more than a hundred years, as is well attested by numerous writers upon natural history.

Dr. Trimble, of New Jersey, gave a lengthy lecture upon the locust, showing how the insect deposits its eggs in the limbs of almost every variety of trees. A great number of these twigs were distributed among the company, to show the curious manner in which these eggs are deposited.

This peculiar insect appears once in seventeen years; but the year of its appearance differs in every part of the country. In 1855 it infested southern Illinois. In 1800, 1817, and 1834 the trees of Delaware and Maryland were literally covered by them; and in 1843 many of the river counties on the Hudson were infested with the Cicadæ. The male insect has a pair of drums on each side of the head, and, when infesting an orchard or woods, the noise is frequently so great that no conversation can be heard in the vicinity. The insect appears about the 25th of May, and remains six weeks. The female is armed with an *ovipositor*, with which she inserts her eggs in the smaller portions of limbs of fruit-trees, oaks, chestnuts, etc., always selecting new growth, of an eighth to a quarter of an inch in diameter. The incisions, about twelve in number, are made at an angle of forty to fifty degrees, with an egg in each, and sometimes the twig is girdled near the eggs, so that when the end of the twig dies it falls to the ground, and the eggs are carried in by dews and rains. Miss Morris, of Germantown, Pa., a well-known entomologist of close observation, claims that she found them attached to the roots of pear-trees.

"While plowing at our place, May 10, these insects were thrown out in large quantities. The holes through which they ascend in the soil may be traced to a depth of four feet or more. This locust is not to be dreaded, as they do but little harm; are not known to feed, and the shortening-in of limbs by the depositing of their eggs may give a useful hint to those who do not understand the benefits of the shortening-in process."

He also gave an account of a maple-tree in Newark, which appears to have a sort of bohun upas effect upon flies; they lay dead by thousands under this tree.

Prof. MAPES stated that, in plowing upon his farm near Newark, in May, the seventeen-year locusts were turned up in vast quantities.

Dr. TRIMBLE stated that this insect does not consume vegetation. They are within a few inches of the surface, waiting for the right condition of the temperature to issue forth. Seventeen years ago these insects came forth on the 25th of May, and immediately commenced their musical notes. They remain about six weeks above ground, eating nothing. The injury they do vegetation is by puncturing the limbs to deposit their eggs. This kills the ends of the branches. The apple-tree and elm-trees are favorite trees with these seventeen-year locusts. The time of their appearance varies in different localities. This is the year for all this vicinity and up the Hudson River. My opinion is that the life of the insect is sustained under-ground by attaching to the roots of plants. The limb selected for puncture is always small.

The Secretary stated that the size of the limb punctured is not usually over an eighth of an inch.

Mr. DODGE stated that the locusts were very plentiful on Long Island five years ago, and that he has seen them every year in this city.

Prof. MAPES thought that these fellows would be a little too much for "insect powder." Still, he had received great benefit from one called the "Persian Powder." That will enable me to grow early turnips, and it will kill caterpillars.

Mr. GALE—In 1809, in Orange County, the locusts were plentiful enough to allow me to gather bushels of them, and the apple-trees were covered.

The only injury was to the small twigs. Wheat-fields were covered, but not injured.

ANDREW S. FULLER—In 1855 the locusts were very abundant in Illinois, and came forth out of heavy clay land, from more than four feet in depth, in oak forests. They appeared to prefer the oak-trees.

The Chairman stated that he had observed their preference for oak in some instances, but upon the whole, he thought they had very little care for any particular sort of trees.

Dr. TRIMBLE thought the chestnut was their favorite. I found, yesterday, the eggs of the locust are beginning to hatch, and the young insect is as perfect in shape as the old ones, of a pure white color, and no larger than one of the eggs.

Habits of Grasshoppers.—A Goliad correspondent of the Colorado (Texas) *Citizen* gives some curious facts in relation to the grasshoppers which have recently swarmed in that region. He says:

"They have an especial fondness for wheat and cotton, but don't take so kindly to corn. The only vegetable they spare is the pumpkin. The most deadly poisons have had no effect upon them; fumes of sulphur they rather like than otherwise; musketo-nets they devour greedily; clothes hung out to dry they esteem a rarity; blankets and gunny-bags they don't appear to fancy. They swim the broadest creeks in safety, sun themselves a while, and then go on. The whole mass appear to start and move at the same time, traveling for an hour or two, devouring everything in their way, and then suddenly cease, not moving perhaps for a week, during which time no feeding is noticed; and finally, they carefully avoid the sea-coast."

Grasshopper Parasites.—SOLON ROBINSON—I have a letter from L. B. Rice, Middlebury, Vt., inclosing specimens of grasshoppers, showing a parasite that is preying upon them, which, it is to be hoped, will help to annihilate this pest. This parasite is a small red insect, which attaches itself to the grasshopper just under the wing.

255. **Canker-Worm Preventives.**—The following letter to the author, from a New York city friend, is worthy of attention by all whose trees are eaten by worms:

"SIR: Your recent discussions upon the canker-worm, which is so seriously devastating the foliage of the city, stir me up to lay before your readers the information which some years of careful observation have enabled me to gain respecting this pest of our neighborhood. I do this the more because I notice some suggestions in your conversations which look to the adoption of remedies; and before any remedy is tried, it is essential that we have some assurance that it will be effectual.

"I was a student in New Haven at the time when the ravages of the insect were so severe in that city, and witnessed the extreme desolation which the creature produced. The magnificent elms which are the glory of that beautiful city, stood bare and wintry at the end of June, with every vestige of their foliage utterly consumed. I noticed, and have since repeatedly observed, how perfect a protection is afforded by the metallic girdle which you describe. Whether the plan of a Mr. Taylor, spoken of in the papers, is an improvement, I am not able to say.

"The whole merit of the plan, however, consists in its adaptation to the habits of the insect. The female—which deposits its eggs upon the body and branches of the tree before the opening of the spring—is wingless, apterous, as we say in Entomology; and being incapable of flying, is effectually arrested by the barrier which is presented by such an open tube encircling the tree. The protection is complete, the application is easy, and the remedy is effectual.

"One fact, however, is to be taken into view, which effectually alters the case with us. After familiar study of our New York insect, for several years past, I am convinced that it is *an entirely different species*, of different habits in many respects; and, above all, different in the one particular which gives all its value to the New Haven remedy; our species *fully possesses the power of flight*. Its progress, therefore, to the body and limbs of the tree for the purpose of depositing its eggs can never be in the least arrested by any such measure as your correspondent proposes to adopt. Protection against the worm in our city can be obtained only by the same method by which New Haven derived hers, viz., the thorough and careful study of the habits of our own species of insect.

"The very positive assurance of your correspondent, Mr. Webb, that 'it is a law of nature that all the millers which produce the measuring worm have no wings by which they can fly one inch,' is in the main true, though perhaps rather strongly stated; but it applies only to the canker-worm of New England. *Our species* may be seen flying abundantly, both males and females, ascending above the tops of our highest trees, and reaching the large branches with absolute ease. After having observed the whole process very carefully, I am in a position to speak confidently about it; and I beg to assure your readers that any attempt blindly to imitate the New Haven method will only prove a mistaken and unprofitable, because ignorant, attempt. In order to ascertain with greater certainty the truth upon this point, I transmitted specimens of our New York miller, last summer, to Mr. E. C. Herrick, the accomplished librarian of Yale College, whose investigations of the New Haven canker-worm were published at length, some years ago, in the *American Journal of Science*, and received from him the assurance that my impression that the two species were entirely distinct was no doubt correct. Mr. H. also concurred with me in thinking that the power of flight possessed by the New York moth would require entirely different methods for the prevention of its ravages.

"The one method which my observation has suggested as effectual, consists in thoroughly scraping the tree after the eggs of the moth have been deposited upon it. The worm with us does not, as in New Haven, go into the ground and remain there till the winter, but goes through its changes in a very brief period. After coming down from the tree, it lays itself up in a cocoon, formed of a few thin fibers of silk, in the crevices of the bark of the trees which it frequents, or upon posts and fences near the tree. There the insect may then be found, undergoing its change. After about a fortnight, it comes forth in the shape of a white moth, somewhat less than an inch long. At that period our parks and public squares are alive with these millers; the grass is studded, the paths covered, the air filled with them. Any one may easily satisfy himself of their power of flight by a careful observation of them. The antennæ, or feelers, projecting from the head, are in the males feathered, or, entomologically, *pectinated;* a row of fine fibers, like the teeth of a comb, lines each antenna upon one side; the females have the antenna plain and straight; and they may also be distinguished by the larger size of the abdomen, which is distended by eggs. No difference, however, in the power of flight will be observed between the two sexes. On coming out from the cocoon the sexes meet, and the impregnated eggs are at once laid upon the bark of the tree. They may be seen in patches, varying from a dozen to fifty, or even more—minute, green globules, which soon change to a dusky gray or brown, scarcely distinguishable in tint from the bark. They adhere by a glutinous secretion very firmly to the tree, and remain through the year until the warmth of another spring hatches them into life.

"At any time after the eggs are laid in the beginning of July, and before they are hatched in the beginning of the following May, a careful scraping of the tree will remove most of them, and so prevent their ravages for the next summer.

"Having frequent occasion to pass through Washington Parade Ground, I have pointed out the eggs upon the bark to the persons intrusted with the care of that spot, and the trees have been sometimes scraped in the spring, with very good results. This year it was omitted, and the deserted shells of the eggs of last year may now be seen on the trunks of the trees so seriously injured by them this summer. No other method than this affords the least security; but this, if faithfully carried out under any competent supervision, can be made entirely effectual. The eggs remain for nearly a year before they are hatched, quite obvious, and tolerably accessible. A couple of men would in two or three days clean any one of our parks of this destroying agent for the next summer; and careful attention for a few years throughout the city would nearly exterminate the pest."

256. **Garden and Field Crop Pests.**—The amount of damage done to farmers every year by bugs and worms, if it could be exhibited in figures representing dollars and cents, would exceed the whole value of the wheat crop, or corn crop, or cotton crop, and it would not surprise me if it exceeded the value of all of them. If we could give certain preventives of the ravages of any one of the pests, we could afford to devote much more space than we shall allot to this head. But we will urge farmers to give the subject more attention. Buy the best works upon entomology, and devote many a winter evening to the careful study of the appearance, character, and habits of all

the insects that consume your crops. Give, we pray you, good attention to what we have already said and shall say in this section. You can not fail to find something that will repay you well. You certainly will find valuable information in the following paragraph, written by A. S. Hall, of Malden, Mass., in May, 1860:

257. **Salt for the Onion Maggot.**—Much has been said and written about the onion maggot, and I don't know that there is any cure for him; but I will tell you how I treated mine last year, and with good success for once, and shall try it again this year, and will tell it to you and the farmers free of charge, for I don't think I could get "$60,000" for it if I should ask it.

I sowed last year in my garden, on good soil, three rows, about thirty feet long each, to onion seeds. I expected the maggots, and watched diligently their progress. When they were first up about one or two inches high, I put some strong salt and water on about three feet of one row, to see if it would kill the onions, and, in case it did not, perhaps it might kill the maggots, if they came. The young onions stood it well, and it did not hurt them.

After the onions had got about as large as a pail-bail wire, there came a spell of warm, wet weather, and my onions began to be affected. I watched them several days, and they grew worse, and were fast dying out, for about one in every eight or ten were wilting and dying, and I found a maggot at the roots of every one that appeared wilting, and sometimes the maggot was nearly as large as the little stock itself, and had eaten the bottom all away, and was making its way up the stem; at the rate of havoc they were making, it appeared there would not be one onion left in the bed at the end of four weeks more. I took a pailful of strong pickle from my pork-barrel, and, with a watering-pot, put it all on to the three rows, as though I were watering them; the onions never faltered or changed. The salt killed all the grass, young clover, and weeds, except purslane, which came up later, and the maggots were entirely killed, and I never saw any after, though the flies continued to lay their eggs down the side of the little plant, and between it and the dirt, just as flies will blow a piece of fresh meat; but the salt prevented their maturing or hatching, and I raised a good crop of fair-sized onions. I think they did not ripen as well as usual, but I am not convinced that the salt prevented them, for I have often seen patches remain as green as mine were at harvest-time.

I put on two or three slighter sprinklings of brine after the first, during the summer.

258. **Essay on the Cut-Worm.**—*Read before the Chicago Gardener's Society, August 6th*, 1860, *by* JNO. PERIAM.—I acknowledge my inability to do justice to this subject, from not having given it my attention, except in a general way. It is, nevertheless, one which interests agriculturists, and particularly horticulturists, as much, perhaps, as any other entomological subject with which they have to do. The farmers, working on a more extended scale, using larger fields, and planting fewer varieties of hoed crops, do not

notice, nor perhaps suffer as much from the ravages of these families of the Lepidoptera as the horticulturist proper. And the great order of insects to which this class belongs are, perhaps, the greatest scourge with which the worker in the soil has to contend. According to Dr. Fitch, the most of this species belong to the genus Agrotis, of the family Noctuidæ, or Owlet-moths. In England, the insects of this genus are named Dart-moths, from a peculiar spot or streak which many of them have near the base of their fore wings, resembling the point of a dart or spear, and he says that much the most common species of this genus in the State of New York can be nothing else than the Gothic dart, *Agrotis subgothica* of the British entomologists. They are the same which flit about the lights in summer evenings, and are found hid by day within crevices and shutters. To show still further the importance of this class of insects, I will quote from Dr. Harris, showing some of the families. He has divided them into three sections, called Butterflies, Hawk-moths, and moths corresponding to the *genera* Papilio, Sphinx, and Phalæna of Linnæus.

To the first of these orders belong the caterpillars of our common butterflies, many of which are very destructive to vegetation. To the second belongs that class of caterpillars which infect the potato, the grapevine, etc.; the Algerians, or, as they are commonly called, Borers, which latter name, however, is equally applicable to the larvæ of insects of many other orders. The third great section includes a vast number of insects, sometimes called Millers, from their dusty covering, or Night Butterflies, but more frequently Moths. Among these are the Cut-worm, the Bee-moth, and all other insects belonging to the order Lepidoptera which can not be arranged among the butterflies and hawk-moths.

The most common of the Cut-worm tribe which have come under my observation the present season, are the Striped Cut-worm, the Red-headed Cut-worm, and the Black Worm.

The first is of a dirty whitish color, inclining to brown, with darker stripes. This worm works upon the surface of the ground, and may be found at any hour of the day, if damp and cloudy. The red-headed cut-worm has, as its name implies, a red head, and is of a uniform pale brown color, and has this season been particularly destructive; and as it works under ground, it is death to whatever it attacks.

The Black, or (as it is sometimes called) Tiger worm may easily be known when seen by its dark, dull brown color and black head. It works under ground, just below the surface, drawing the stems and leaves after it into its hole.

There are a number of others, among which are the faintly-lined cut-worm and the white cut-worm. Of the latter, I have not found a single specimen this season, though last year I found several. They are rare, and consequently do but little damage. In this day of patent discoveries, any one who has plenty of money and ample time to spend may furnish himself with a thousand-and-one nostrums which are said to be *effectual extermi-*

nators. Snuff, strong liquid manure, powder, charcoal dust, etc., will protect, provided they can find plenty to eat elsewhere; if not, they care about as much for them as I should about wetting my feet in wading a brook for my dinner, if I could not get it by any other means. I am satisfied that they might be, in a great measure, exterminated by neighbors joining, during the prevalence of the moths, and setting torches or building fires for them to fly into. I saved my tomato crop, the present season, by having my men go over the ground in the morning, soon after daylight, and pick up the worms by hand. The first morning we secured over two thousand by count, and the next morning we gathered over a half peck of them on about an acre and a half. After that they began to diminish, and in a few days scarcely one could be found. I protect dahlias, and other choice plants, by wrapping paper about the stems; vines, by planting plenty of seed, and killing the worms; vine shields, if set two or three inches below the surface, will generally protect. I have never succeeded in trapping them in holes, because, if they fall into them, they can dig out, if they can not crawl out. The best way to protect against their ravages is to plant plenty of seed, protect the birds, and then help them kill the worms.

The London *Gardener's Chronicle* says there is a prospect of a total destruction of the grass in the London parks, by the grub of an insect known as "Daddy Longlegs," which eats the roots of the turf and totally destroys it. "Various remedies have been tried without success." Have any of those remedies been a heavy dressing of salt? If not, it should be tried at once. And besides that, we should like to know what this "Daddy Longlegs" is. It can not be our cut-worm, that sometimes destroys the turf in old meadows; and certainly it can not be the "Daddy Longlegs" of our acquaintance, for that, so far as our youthful entomological researches went, was a very harmless Daddy, which had very long, slim, crooked legs, attached to a round body, the size of a small pea.

259. **Wire Worms.**—"A Young Farmer" wants to know what he shall do to get rid of wire worms. He says:

"An old gentleman not far from me says: 'Soak the seed over night in copperas water, and the wire worm will not trouble it.' Who knows whether this is so or not?"

Ah! who knows? Does anybody *know* anything?

Another says soaking seed in a solution of niter will prevent destruction. If so, how easily practiced! Again, who knows?

Probably the best remedy against wire worms is not to grow them. Keep no old meadows. Break them up. Plow all your sod and stubble land in the fall. Either bury your worm seed too deep to get out in time in the spring, or else freeze it to death in the winter. There is probably no remedy equal to deep plowing in the fall of the year.

Perhaps we might all learn useful lessons from nature if we would more carefully read her printed pages. For instance, one who does try to read such lessons says:

"So far as my observation goes, the wire-worm is most troublesome in seasons after a mild winter, or when there has been a heavy coat of snow on the ground during winter, thus preventing the frost penetrating the earth to any considerable depth. Consequently, the worms remain near the surface, and are not frozen to death or driven so far below the surface that they must starve before they can return. Two successive crops of buckwheat will generally rid any soil of wire-worms."

And we add, so will ten bushels of salt per acre, and every worm that is killed by it will fertilize a whole handful of grass. Salt, alone, is an excellent manure; salt and lime still better, prepared according to the formula under the head of "salt and lime mixture." Thirty bushels of lime, in powder, sown broadcast, will destroy the worms in many a field that has been almost barren, and make it productive of fine crops of wheat, clover, corn.

"How to get rid of the worms," is one of the most important questions that a farmer can ask, and the want of a knowledge how, is not confined to young farmers. Hence, all we say upon the subject is worth treasuring up in the great store-house of knowledge, the human mind.

260. **Worm-Killers.**—A reliable South Carolina acquaintance, Col. A. G. Summer, of Pomaria, declares that China berries applied like manure to soil will expel all grubs and worms. "China trees" are as common all over the South as locust or ailanthus here, and they are very fruitful, the berries resembling small cherries in size, and pulp surrounding a hard seed. Only a few years ago, the fact was discovered, rather accidentally, that the wood of this tree would bear a high polish, and that furniture made of it was as strong and handsome as that of some of our most expensive imported woods, and that its natural pleasant odor, like that of cedar or camphor wood, remains, and is a great preventive of moths. The botanical name of the "China tree" is *Melia azedarach;* sometimes called the great *Indian lilac.* It is a hot-house shrub here; at Charleston, it grows fifty feet high, and is a beautiful shade-tree, its greatest objection being its abundance of berries falling upon the ground, notwithstanding which it is a great favorite in all the most Southern States, and its berries, if of any value, could be had here at a small price.

261. **Tobacco-Worms.**—These destructive pests of the tobacco-planter, it is well known, can be subdued with a flock of turkeys better than in any other way. As both turkeys and worms are large, the operation can be seen and appreciated; yet we have no doubt that a flock of wrens do just as much toward the destruction of some other family of worms, and really effect as much good to the farmer. And so of every other class of birds. Cultivators of other crops ought to take lessons from the tobacco-growers. The first glut of worms, in July, is easily subdued by the turkeys, while tobacco is small, and the worms are doing but little damage. The trouble comes in August, but the destruction of the worms a month sooner may save the crop.

Mr. Wm. Sheppard, of Ann Arundel Co., Md., has been very successful in poisoning the moth that produces the tobacco-worm, by the use of cobalt —a quarter of a pound to a half pint of water. This is made quite sweet with refined sugar, and the mixture is put into a small bottle, with a quill in the cork, and two or three drops through the quill deposited in the blossom of the Jamestown weed, or in the blossom of the tobacco-plants. The horn-blower will suck the poison till he dies.

The trumpet blossoms of the Jamestown weed are favorite resorts of the moth, and are gathered fresh, and fastened to the tobacco-plants, or upon sticks set through the field. It may be worth while to grow the weed on purpose for traps.

The cobalt is the same black powder often sold by druggists as "fly poison." It should be reduced in a mortar to a fine powder before using. It is worth while to try it for other insects, placing it upon plates in their haunts.

Mr. Sheppard thinks any planter may protect himself against the tobacco-worm with this poison.

John G. Bergen, of Long Island, stated to us, in the spring of 1860, that he had been obliged to send all his laborers into his tomato-field to kill worms that are destroying the plants and young fruit. He thinks it identical with the tobacco-worm, having grown tobacco a few years ago and been troubled with the same kind of worms. One of Mr. B.'s neighbors told us afterward that the worms were not only very troublesome on the tomato-vines, but were eating the potato-vines ravenously.

The New Haven *Courier* said the potato-vines in that State were being eaten by worms, so as to destroy the prospect of a crop, and these worms, we judge, are the same kind as those on Long Island.

In this city, worms have been for years destroying the trees; none but the ailanthus escapes them.

Is it not worth while to try to poison the insects while on the wing, in the way indicated above, or some other way?

The Jamestown weed mentioned above, we take to be the same weed that grows along many New England waysides, called "Jimson weed," or "stink-weed." It is the *Datura stramonium*.

262. **Bug Remedies.**—Here is a good one! We haven't a doubt as to its efficacy—not one! try it. A correspondent says: "I have seen many plans recommended for removing and keeping bugs and other insects from vines, and among them, snuff, soap, mustard, etc., all or any of which articles must, in my opinion, more or less injure the plant. I have found this the case from experience; and I have also found, by the same means, that the best preparation for this purpose is a cold and very strong decoction made with water and manure from the hen-roost and cow-yard, and applied morning and evening. The insects do not relish this preparation, while the plants to which it is applied do."

Another one says: "I preserved my vines last year from the ravages of the striped bugs by placing little wads of cotton, saturated with spirits of turpentine among the vines near the roots, using care to have them not touch the vines. The turpentine should be renewed from to time."

Another says: "These pests of the vines may be easily got rid of by building a fire of light wood that will blaze freely in the evening. All insects fly into a blaze, and are thus destroyed in myriads."

It is recommended by J. M. Dimond, of Eaton Co., Mich., to plant in the same hill with summer squashes or melons, etc., some seeds of the winter squash, such as have the largest succulent leaves. He says the bugs will not molest the smaller vines under such circumstances. When danger from bugs has ceased, then the plants can be removed.

Another one gives the following as a sure specific for bugs on vines: "Having seen by your paper that many truckers in your section are anxious to ascertain a simple and sure remedy to destroy bugs on squashes, cucumbers, and the like, I will give you one which is almost a specific, and within the reach of every one, especially those living on the sea-board.

"Procure fresh fish—of any kind whatever, the commonest and cheapest just as good—a sufficient quantity according to circumstances, say one peck to a barrel of water. Let them stand therein a day or two, in order to commence decomposition and emit their *necessarily unpleasant* odor; then dampen the leaves with the liquid.

"In addition to driving away the bugs, your plants will become green and healthy, and soon grow beyond the reach of any future swarm of depredators. It may be necessary to use the water two or three times in the course of two weeks, but remember that every application is equivalent to a dressing of manure, which will amply repay for the labor, which is very trifling. Fresh fish offal is of equal value with the fish."

263. **Potato Bugs.**—It is quite as useful to report failure as success in farming. We are therefore obliged to Horatio J. Cox, of Zanesville, Ohio, for telling us that he tried powdered lime, and also ashes, sifted upon his potato vines to prevent them from being eaten by the potato bugs, but he found them at work as usual, with their backs white with lime. His conclusion, therefore, is, that that is no remedy against the depredations of these pests. He remarks that "there are two kinds working in concert, but, from my observation, keeping up separate breeds—the black shell and the striped shell; the latter is more active than the other, and not quite so plump."

A French paper gives an opinion that nearly all the diseases of plants, including potato-rot, are occasioned by insects. The insects, in many cases, are microscopic. The little aucaris, for instance, although so very minute, is a great destroyer. It causes little scabby pustules upon fruits, particularly fine pears.

Whether the potato bug always found on the diseased vines is the cause or effect of the disease, is a mooted question.

Although Mr. Cox did not stop their depredations, we still recommend liberal dressings of ashes and plaster, and if these do not kill the bugs, they will give the vines a vigorous growth. So with lime and salt.

264. **Protection of Turnips.**—The following, from an English newspaper, is equally worthy of attention in America:

"In the list of patents for which provisional protection has been taken out is a machine of a novel and somewhat curious character. The specification, as taken from the list, describes the machine as a 'blast drill,' the object of which is to protect the turnip crop from the ravages of the fly and the slug, and its other numerous enemies, and secure, as far as human ingenuity can accomplish it, this most valuable of all bulbous roots. The common practice of protecting the turnip from the fly is by dusting the row with lime during the night and while the dew is upon the plant. This operation is difficult, and imperfectly performed. Besides the slow process of doing this by hand, the difficulty of dusting the under side of the plant as well as the top side offers an insuperable objection to this mode of applying lime, soot, or any other compost, to the young turnip-plant. This difficulty is now overcome, and the lime (a mixture of one sixth of soot with it is recommended) is thrown, by means of a blast fan, upon every part of the plant, both on the upper and under side. The fan is put in motion by the traveling wheels of the drill, and receives its velocity in the usual manner by gearing wheels. The blast thus created by the fan is brought to bear upon the plant, which, yielding to its action, bends from the current, and as it acts upon a falling stream of lime or other composition, the plant becomes completely covered with the powder. But this is not the only object the blast drill will accomplish. The fly, disturbed by a simple contrivance, hops away, but is at that moment caught by a current of air entering the blast fan and instantly destroyed, and thrown out again with violence from the vortex into which it had been drawn. This operation is simple, and the process of annihilation is similar to that of a mouse or rat going down a thrashing-machine. The fly and the lime are so completely mixed and incorporated that the mischievous yet delicate insects are destroyed by the atmospheric pressure thrown upon them, and the plant is also secured, by the dusting of compost, from all future attacks of the enemy. All farmers can not fail to know something about the insect which does so much annual mischief to the turnip crops. Sometimes a fallow, which in tillage and labor has cost £5 or £6 an acre in preparing it for a crop of Swedes, has had all the labor and capital expended made vain by the fly. Can this evil be remedied? It seems possible; and if this invention of a blast drill should be the means of securing a turnip crop, or even improving it, by the application of a top-dressing of soot or guano, or any other soluble manure, a great good has been accomplished, not to farmers only, but to the community at large."

265. **Pea-Weevil—How Destroyed.**—One of the greatest pests that growers of peas have to contend with is the pea-weevil, *Bruchus pisi*, which sometimes attacks every pod, and leaves an egg to hatch into a disgusting insect in every pea, so that, if intended for food, when dry, we shall find a modicum of meat ready mixed in our pea-soup. If intended for seed, when we are ready to plant in the spring, we find the life of our peas eaten out.

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Although several birds, of which the crow and Baltimore oriole are the chief, feed upon the pea-weevil, they are very far from destroying it, and the evil is annually increasing. How can this insect be destroyed, is a question worth solving. We think it can be, if farmers and gardeners would make a united effort, totally annihilated from the country. The remedy is very simple. It is to steam all the seed peas. This can be done in a small way in families by taking the seed, so soon as gathered, shelled, and dried, and placing it in a cullender, covered with a cloth or plate, and placed over a kettle of boiling water until the steam is thoroughly passed through the peas, when they are to be dried in the sun and put away in paper bags. Upon a large scale, the peas may be steamed in bags or barrels, by inserting a steam-pipe from a boiler at so low a pressure that it will not cook the peas, but it will the pupæ of the pea-weevil. Let it be remembered that steam, properly applied, will totally eradicate the pea-weevil from the land And if from peas, why not from wheat, corn, and rice, easier and better than by kiln-drying? It would be very easy to dry the steamed grain. Passing it through a fanning-mill would probably be sufficient; or pouring it out of a basket, where it would fall fifteen or twenty feet through the air.

266. **Preserving Insects.**—Insect collectors will find the following method of killing the insects they wish to preserve one of the most convenient of any they have ever tried. Dissolve cyanide of potassa in water to saturation, and keep it tightly corked in a small vial, and it will always remain in good order for use. When you catch a fly, moth, insect of any kind, or a beautiful butterfly that would be injured in fluttering, dip a needle-point in the solution, and prick your captive just under the wing, and see how quick and calmly they will lie down and die. Some large or hard-to-kill insects may require more than one stab to make them die peaceably. This solution is used by scientific entomologists in making their collections.

267. **Household Insects.**—*Hall's Medical Journal* states that household vermin may be got rid of as follows: Half an ounce of soap boiled in a pint of water, and put on with a brush while boiling hot, infallibly destroys the bugs and their eggs. Flies are driven out of a room by hanging up a bunch of common plantain (fleawort) after it has been dipped in milk. Rats and mice speedily disappear by mixing equal quantities of strong cheese and powdered squills. They devour this mixture with greediness, while it is innocent to man. When it is remembered how many persons have lost their lives by swallowing mixtures of strychnine, etc., it becomes a matter of humanity to publish these items.

The *Scientific American* says: "Common red wafers scattered about the haunts of cockroaches will often drive away if not destroy them." These wafers, like candies, are colored red by oxyd of lead, a most deadly poison; and so is the acetate of lead, or sugar of lead, as it is sometimes called, on visiting cards, which, being a little sweetish, has been known to destroy young children, to whom they were handed to be amused with. Fashion for once acts sensibly in discarding glazed cards, using instead Bristol board, more pliant, less cumbersome, and really more delicate.

We have found that bugs can not stand hot alum water. Take two pounds of alum, bruise and reduce nearly to powder, and dissolve in three quarts of boiling water, letting it remain in a warm place till the alum is dissolved. The alum water is to be applied hot, by means of a brush, to every joint and crevice. Brush the crevices in the floor of the skirting-board, if they are suspected places. Whitewash the ceiling, put in plenty of alum, and there will be an end to their dropping from thence.

To kill moths in carpets, spread a wet cloth on the carpet, and iron with a hot flat-iron round the edges and places where you suspect them to be. Do this a few times in the course of the summer, and you will save your carpet from the moths.

Silk-worms have been induced to work in France by electricity. M. Sauvageon reports to the Academy his experience in the matter. Finding the little things torpid and unwilling to work, the idea struck him to stir them up by electricity. The results, as he gives them, are really marvelous. He took fifty-three worms at random from among thousands belonging to a neighbor, put them every day on a sheet-iron plate, through which a current of electricity was passed, kept them each time as long as they could stand it, and now has fifty-three beautiful cocoons, an amount which his neighbors will not obtain, to all appearances, from several thousand ungalvanized worms. If these results may be relied on, he has made a very valuable discovery.

268. **Moth Protectors.**—*Camphor* is one of the most useful moth protectors about the household. A trunk full of furs, with an ounce of camphor gum scattered through them, will be safe from moths. Furs or woolens packed in a chest made of camphor-wood or cedar will generally be safe. Some housewives pack in a linen sheet, or bag of close texture. Others use tobacco. Others keep their furs or woolens in drawers or trunks where they will be often exposed to the light, and where they can frequently take them out to the air and sun, and beat them, which will effectually prevent the ravages of the moth. A very good preventive is to carefully kill the miller that makes the worm which is so destructive to woolens and furs. It is not a hard matter to do so in a house not already overrun with them. They may be attracted to a light blaze; and they may be caught in plates with a little sweetened water and vinegar; or a piece of an old blanket may be used as a trap; or they all may be caught and destroyed by hand, by devoting half an hour to the work each evening, in the proper season.

269. **Ants in the House.**—These troublesome pests may be overcome by various remedies. Perhaps one of the best things for the red ants is to mix a few grains of corrosive sublimate in a spoonful of lard, with a little sugar, and then draw rough strings of cotton or woolen yarn through the mixture, and lay them in the cracks where the ants harbor, or in the corners of closet shelves. They may also be poisoned with cobalt, pulverized fine and mixed

with something sweet that they like to feed upon. These and other insects can be poisoned by arsenic. They may be kept from the sugar-bowl by setting it in a plate covered with powdered chalk. The whisky remedy recommended in No. 254, to protect trees from ants, may be adopted in the house. The bug-powder mentioned in the same number, made of red chamomile, can also be used in the house for ants and other pests. For the large black ant, the best vehicle for poison is old cheese. Dip a piece of it in a poisonous solution, or moisten it if dry, and dust it with corrosive sublimate or arsenic.

Be very careful, in the use of poisons, not to get them mixed with food. There is no more danger, with proper care, than there is in keeping gunpowder in the house.

270. **Insects Beneficial to Farmers.**—It is not to be inferred that because an animal is called an insect, it is pestiferous. The contrary should be taught in all schools, as well as in home lessons. The false idea is prevalent that all sorts of insects, bees excepted, are mischievous, hurtful, and hateful; so that every worm, bug, fly, moth, miller, or little crawling, creeping, flying thing is looked upon by almost every one with a feeling of desire to crush it. A contrary feeling must be cultivated. Children must be taught to discriminate between good and evil insects, as well as between good and evil deeds. A cloud of moths might be seen hovering around the wheat, and the farmer, under the supposition that they had come to destroy the grain, might destroy them, and afterward find that he had killed his best friends—the parasites of the wheat destructors. Before we declare a war of annihilation, as many have against the birds, upon any class of animals, let us first inquire which are and which are not noxious. We will here briefly point out a few.

The common angle-worm, instead of being detrimental to the farmer, is actually a co-laborer, and often a better one than the biped owner of the soil. A scientific writer on Zoology says:

"The burrowing of earth-worms is a process exceedingly useful to the gardener and agriculturist; and these animals are far more useful to man in this way, than they are injurious by destroying vegetables. They give a kind of under tillage to the land, performing the same below the ground that the spade does above for the garden, and the plow for arable land, loosening the earth so as to render it permeable to air and water. It has lately been shown that they will even add to the depth of soil; covering barren tracts with a layer of productive mold. Thus, in fields that have been overspread with lime, burnt marl, or cinders, these substances are in time covered with finely divided soil, well adapted to the support of vegetation.

"That this result—which is most commonly attributed by farmers to the 'working down' of the material in question—is really due to the action of the earth-worm, appears from the fact that in the soil thus formed, large numbers of 'worm-casts' may be distinguished. These are produced by the digestive process of the worms, which take into their intestinal canal a large quantity of the soil through which they burrow, extract from it a great part of the decaying vegetable matter it may contain, and eject the rest in a finely divided state. In this manner a field manured with marl has become covered, in the course of 80 years, with a bed of earth averaging 13 inches in thickness."

White, in his "Natural History of Selborne," says:

"Worms seem to be great promoters of vegetation, which would proceed but slowly without them, by boring, perforating, and loosening the soil and rendering it pervious to rains and fibers of plants, by drawing straws and stalks of leaves and twigs into it, and most of all, by throwing up such infinite numbers of lumps of earth, called worm-casts, which, being their excrement, is a fine manure for grain and grass."

It is a part of the system of comminution spoken of under another head; and if all the earth could be eaten by worms, it would serve as a manure for crops, simply because it had been pulverized, and thereby fitted for their use.

Some time since, in company with several gentlemen, we listened to a conversation with reference to the value of the earth-worm, one gentleman claiming that they were a nuisance in the garden, and others asserting that they were a great blessing, as mole drainers, and always an index of the fertility of the soil. Here is a paragraph from the *Encyclopædia Britannica*, right to the point:

"The common earth-worm, though apt to be despised and trodden on, is really a useful creature in its way. Mr. Knapp describes it as the natural manurer of the soil, consuming on the surface the softer part of decayed vegetable matter, and conveying downward the more woody fibers, which there molder and fertilize."

271. **Plant-Lice Destroyers.**—There is an ichneumon fly, a very small blackish insect with yellowish legs and abdomen, not quite the twentieth of an inch long, which destroys myriads of aphides. The female lays an egg in each louse, and the grub from that devours its nest, leaving only the skin attached to the leaf, serving for a shelter for the larva in its pupa state. The fly comes out of a hole in the louse's back, and repeats the operation. Careful examination will disclose a great many of these perforated empty aphis skins upon plants that would be entirely destroyed by a long-continued multiplication of their consumers, but for this little parasite.

The *Syrphus* is the name of another destroyer of the aphis that abounds upon cotton-plants. This is not a parasite; the eggs being laid on the leaf among the aphis, the maggot, which is, when full grown, about one fifth of an inch long, makes its food of the lice. The pupa is formed on the leaf, in a case made by the worm of a glutinous secretion—the juices it has sucked out of the lice it fed upon. The fly is seven tenths of an inch across the wings, which are double; the body appearing like a diminutive wasp, banded with brown, black, and yellow. It hovers much on the wing, without much motion, unless disturbed, when it shows its power of swift flight. This louse destroyer does not confine its operations to the aphis of cotton-plants, though it seems to prefer them. It is of immense service to Southern farmers.

The *Lady-bird* (Coccinella) is another valuable assistant to the cotton-planter, in particular. Where the lice most abound, there will be found the lady-bird doing its work. Yet there are numerous planters who, seeing this insect hovering over the cotton, suppose it the parent of the pest they stand so much in fear of, and direct the negroes to destroy all they can. It was a negro who first discovered that the worms hatched from their eggs, which are deposited on the leaf near the aphis, actually consume them, instead of the cotton-plant. The worms are a quarter of an inch long, bluish-black, and voracious as an alligator, to which they bear some slight resemblance. They seize and eat the lice alive, until all upon the leaf are consumed, when the grub fastens itself by the tail to the leaf to await its change. The insect while on the wing is also a louse-eater. A disagreeable odor emitted by this insect will serve to identify it.

The larva of the *lace-wing fly* is another cotton-aphis eater. These worms are hatched from filaments of eggs, which the fly attaches to the under side of the leaf near an aphis colony. This larva is not quite one fifth of an inch long. It may be known by the way it holds by the tail, while stretching out full length looking for its favorite food. It spins a little cocoon, out of which, in due time, comes a bright green fly, with brilliant eyes, and four transparent greenish wings, delicately netted like fine lace—hence the name. This insect also belongs to the fetid-odor family.

272. **Other Insect Destroyers.**—The *Carolina tiger-beetle* is a beautiful insect, seven tenths of an inch long, of metallic blue, violet, and green color, and savage propensities toward all other insects.

The *Harpalus* is another insect-consuming beetle, with very strong hooked jaws adapted to a predatory life. If it can not find living food, it will consume dead, putrescent substances.

The *Mantis*, an insect known in Maryland as the "rear horse," is a voracious consumer of insects. In fact, it is said that they will sometimes consume one another. The largest are over two inches in length, of a very awkward-looking form. The eggs attached to a limb look like an excrescence, and are often attacked by an ichneumon fly, as a place of deposit for its eggs. The young mantis comes out in June, at first without wings, but with a strong appetite for aphides and other insects. It stands upon four hind legs, with body elevated and forward feet closed, and head constantly moving. It walks, or jumps, when alarmed, but is capable of domestication so as to come and take food out of the hand, and is perfectly harmless except to things obnoxious to man, and for that it should be preserved. Its color is brownish gray to light green, and its form will be remembered from a picture of it, or after being once seen or known.

The *Reduvius novenarius* measures an inch and a quarter in length, and destroys multitudes of insects in all their stages of transformation. The eggs deposited in autumn hatch in May or June; the young worms are marked with a black head and thorax, and bright red abdomen, and black spots on the back. They afterward appear of a grayish color, with rudiments of wings, which at length enable them to fly with strength. It approaches its prey cautiously, and makes a dart, and pierces it to death, and then sucks out the substance. It eats the common tree-caterpillar voraciously, and it sometimes wounds a person handling it incautiously with its sharp piercer.

There are numerous other parasites of noxious insects, and insects like those named, which prey upon others, which are really beneficial to the farmer, as are many quadrupeds and other animals that are natural insect-eaters, such as toads, moles, skunks, etc. The most important of all, perhaps, we mention in the next paragraph.

273. **The Wheat Midge Parasite.**—The only hope of relief from the blasting effects of the wheat-midge (323), with those who have thought upon the subject, has been a parasite that would work its destruction. That hope, we trust, is about to be realized. A correspondent of the *Canadian Agriculturist,* writing to that paper in the autumn of 1860, says:

"I am rejoiced that this week I can announce the arrival of a deadly enemy to the wheat midge or fly. In the neighborhood of Sparta, township of Yarmouth, the farmers have discovered some species of ichneumons which deposit their eggs on the larva. One of these is very small, black, and shining; the other is also black, with red feet and a blunt tail. These are often mistaken for the wheat-fly; but as it has only *two* wings, and they have *four*, the distinction is obvious. To observe the proceedings of the ichneumons, place a number of the maggots or larvæ of the wheat-fly on a sheet of paper, and set a female ichneumon in the midst of them; she soon pounces upon her victim, and, intensely vibrating her antennæ, bending herself obliquely, plunges her ovipositor into the body of the larva, depositing in it a single egg. She will then pass to the second, and so on, depositing a single egg in each. You will observe the maggot writhing in seeming agony, when sometimes the fly stings them three times. These ichneumons appear in myriads on the outside of the ear, but, as if impatient of bright light, sheltering themselves from the sun's rays among the husks."

The same thing has been noticed in other sections; and Dr. Fitch, the entomologist of the New York State Agricultural Society, is so much encouraged that a remedy has come at last, that he writes confidently, in November of that year: "The days of the wheat-midge pest are numbered. I fully believe that farmers may again sow wheat without fear of its destruction by the *Cecidomyia tritici.*"

SECTION XIII.—MISCELLANEOUS—WILD AND TAME ANIMALS OF THE FARM—DOMESTIC FISH-BREEDING, ETC.

Moles.—We have for four years (1859–1862) occupied our little farm in Westchester County—one of the many sadly-abused pieces of land, some of that in mowing, not planted for thirty years or more—and in this land we found the moles as thick as we ever saw them anywhere in our life, and therefore have a right to speak of them from experience. In some respects we have suffered severely by them. They have killed many choice things that we have planted, including several valuable grapevines; but we are not yet willing to destroy the moles. We do not look upon them as pests, although they have pestered us. They undermine the plants, but do not eat them What for? It is not for sport, nor merely accidental in boring their subterranean galleries. It is in pursuit of food. And as that food consists of insects noxious to the farmer, this paragraph upon moles comes in course very well after the section devoted to insects. In fact, we believe that the mole is one of man's best friends, and that it never occupies land that is not already so preoccupied with destructive worms as to render it unfit for cultivation. So impressed with this belief are some European people—all Prussia, we believe—that they have enacted laws to prohibit the killing of moles. As with the crow, opinions vary in this country whether the mole is beneficial or injurious to farmers. For our own part, we must say that we never see an account of a "new mole-trap" without wishing the inventor might get his own fingers caught in it. It is a great pity that farmers can not learn that moles are one of the good things that Providence has bestowed upon them—that they do not destroy seeds and plants, but the insects that are great pests to the farm and garden. In this opinion we shall continue until better informed upon this question. In the mean time we give some opinions of others. The following is the sketch of a report of a conversation at the New York Farmers' Club about moles:

Solon Robinson read a letter upon the subject of moles, which elicited a lengthy discussion. The following portion of the letter we print:

"This animal, as you probably know, has a very small apology for eyes, which can not be discovered till the skin is removed, and it can not be ascertained that they are of any practical use. His sense of hearing and of smell is very acute, and he is enabled to elude observation, and to avoid anything unusual that may be placed in his track. No device, however, with which I am acquainted will force him to abandon a well-cultivated track, abounding with earth-worms, which are his chief attraction. He will pass from hill to hill, severing the corn, melon, or other seeds from the tender plant, thus greatly impeding its progress, and in many instances wholly destroying it. In a scarcity of earth-worms he will prey upon beets, potatoes, and other roots with voracity; still the damage he thus does is of little account compared with that produced by his relentless plowing or rooting. Where the soil is fertile and not too wet, this intruder will be found undermining all vegetation, and is a source of discomfort to the agriculturist, which must be realized to be appreciated.

"Failures in field and garden, which are often attributed to drouth or insects, are many times produced in a great measure by moles. At morning, noon, and evening the mole goes forth on his depredations, making the most rapid movements (for an underground performance), and in less than twenty minutes finishes his repast, and returns again to his hiding-place deep in the earth, beyond the reach of all intruders.

"The Yankee mole is too shrewd for the English trap, or, indeed, for any, with a single exception. I have examined several traps, beautiful in theory, but they are splendid practical failures."

WM. S. CARPENTER—I am satisfied about the injury of moles to the farmer, being much more than all his benefit in eating worms. I had a bed of tulips destroyed by moles. I traced them by their paths from root to root.

Prof. MAPES—I have tried careful experiments with moles in confinement, and have never succeeded in getting them to eat any kind of vegetable matter.

Mr. MOODY, of New Jersey—I have found that moles do cut off the stems of thorns in my hedge. I can not say that they eat thorns. I am satisfied, too, that they will eat potatoes.

Prof. MAPES—I find that potatoes are eaten in the vicinity of moles, but I am satisfied that they are eaten by grubs that the moles feed upon.

Dr. TRIMBLE—The potato is eaten by the grub of the cockchafer, and not by the mole.

Mr. FULLER—I have known moles to gnaw potatoes, but not for food.

The Chairman, ROBERT L. PELL, made the following remarks upon this subject:

Mole-Hills.—In rich alluvial soils, mole-hills are thrown up in immense numbers, because such soils usually abound with the food that these subterraneous creatures seek for. They destroy the roots of grass immediately contiguous to their mounds, besides often impeding the free action of the scythe, for these reasons. Some think it well to exterminate them; still they no doubt do a vast deal of good by destroying obnoxious worms and grubs.

In the spring of the year it is an easy matter to spread out these mounds over the surrounding ground, as they are dry and powdery, and act to a certain extent as an enriching top-dressing.

The mole can not bear access to the atmosphere, being wholly subterraneous by nature; they never drink, but live entirely upon worms, insects, and the roots of grass, and are never found in gravelly or clay soils.

They breed in April and May, and generally produce four at a birth. The tunnels that they make are invariably parallel to the surface of the ground, and about six inches deep, unless they become alarmed, when they immediately sink to the depth of fourteen inches, rarely deeper. They have cities under ground, which consist of houses, or nests, where they feed and nurse their young; communicating with these are wider and more frequented streets, made by the perpetual journeys of the female and male parents, as well as many other less frequented streets, with diverging branches, which they extend daily to collect food for themselves and families.

Moles are exceedingly active in April and May, during the pairing season, when the tunnels become very numerous, for the purpose of meeting each other. I do not believe that they are blind, from the fact that I have never observed that the mole-hills increase except in the day-time, showing that they do not work by night, which they would probably do if deprived of sight. They commence very early in the morning, when you may often see the mold or grass moving over them; you may then readily cut off their retreat by thrusting in the ground a spade directly behind them, when they may be dug out very easily and killed by the attendant terrier. By placing your ear on a newly-raised hill you may hear them scratching at a considerable distance, and thus be able to find them. You may always discover the locality of their young by observing the hills, which are larger and the color different, a portion of the subsoil being thrown upon top. If you desire to set traps in their tunnels, it will be necessary to discover which are the frequented streets and which the by-roads.

This may be accomplished by pressing the foot lightly on the hill, and if the mole passes that way he will nearly obliterate the mark. You may then set a subterranean trap, and he will be caught. These may be made from a piece of wood, in a hollow, semi-cylinder form, with grooved rings at each end, in which are placed the nooses of horse-hair, one at each end, fastened by a peg in the center, and stretched above-ground by a bent stick; when the mole has passed through one of the nooses, and removed the central peg, the bent stick, by its elasticity, rises and strangles the animal. The structure of this quadruped adapts it admirably to the underground life that it leads. Its head is very long, conical in shape, and tapers to the snout, which is much strengthened by a bone, gristle, and very powerful muscles. The body is cylindrical, very thick on the back of the head, from which it diminishes to the tail. It does not appear to have any neck, but where it should be, there is a mass of muscles, all of which appear to act upon the fore legs and head. These are the instruments with which he excavates the ground; they are harder, shorter, and stronger, in proportion to the size of the animal, than in any other of the mammiferous class. I have never destroyed one of these little animals, because I consider the damage they do to a few roots of grass is entirely counterbalanced by their immense destruction of wire-worms, slugs, etc., besides aerifying, disintegrating, and lightening the soil, and thus fitting it admirably for the purposes of top-dressing.

I never permit the common crow to be destroyed, because he preserves my corn-fields from numerous enemies, keeps off hawks, destroys slugs, snails, grubs, and eats carrion. Nor the black snake, whose constant employment seems to be the destruction of field-mice, and other enemies to the orchard. Nor the cherry bird, because he is always on hand ready to eat the first cherries that ripen prematurely, which invariably contain the worm. Nor the king-bird, wren, or robin, all of which are employed from dawn to dusk in relieving me from my enemies.

275. **An English Opinion about Moles.**—The Royal Agricultural Society's Transactions contains the following opinion about moles. The report affirms that "in one year, and every year, 60,000 bushels of seed-wheat, worth £30,000, are destroyed by wire-worms! This prevents 720,000 bushels from being grown, worth £300,000. If our farmers and others, instead of killing moles, partridges, and pheasants, would *protect them*, 720,000 bushels more wheat would go every year into the English market. But the creature designed by a kind Providence to perform the chief part of this immense good is the *mole!* Some years since I had two fields, one of which was full of wire-worms, the other perhaps a third full. My crops failed on these fields for the first two or three years, but afterward improved rapidly, for I bought all the live moles I could find at three shillings a dozen, and then two shillings a dozen, and turned them into these fields. I had eight quarters of barley per acre and seven of wheat where the moles were at work all summer, making the ground like a honey-comb. Next year, the wire-worms, being all cleared out, my innocent little workmen, who had performed for me a service beyond the powers of all the men in my parish, emigrated to my neighbor's lands to perform the same service, but of course they met death wherever they moved, so that my little colony was wholly destroyed. Now I will receive all the moles that the farmers will give me, and turn them into my glebe."

276. **An American Opinion about Moles.**—An American writer undertakes to criticise what is said above, and says: "This I know from every-day observation to be very erroneous. I do not know that moles eat insects; be that as it may, I have no doubt their living is principally seeds, and roots, and other vegetables. In the winter time, when snow is deep and the ground not frozen, I have known them to destroy whole nurseries of apple-trees, and even young orchards that have commenced bearing."

Now this man don't know what he is talking about. He has confounded mice and moles together. It is the mice, and not the moles, that have been running about in this man's orchard eating his trees. But he believes it is moles, and has a fixed prejudice in his mind against them, which no argument perhaps can remove. We beg of farmers to learn facts about things in which they are so much interested.

277. **Mice and their Mischief.**—Mice, we willingly concede, are mischievous —in young orchards excessively so. Wet seasons are favorable to the rapid increase of field mice, and when followed by snowy winters and unfrozen

turf, so they can have access to the clover roots, they become a scourge. The late dry summers nearly exterminated both rats and mice—probably more from thirst than hunger.

The variety of mice that does most damage to trees is known as the "meadow mouse," which always works under cover, girdling the trees most when the snow lies deepest, particularly if it lies lightly or is held up by weeds and grass, so as to allow the vermin easily to make their paths from tree to tree, or from the tree to their resting-place.

278. **Remedies for Mice Eating Trees.**—Tramping the snow down around the trees is a pretty sure remedy, and where the orchard or nursery is not extensive, will answer to be put in practice, but it would be troublesome on a large scale, as it may have to be repeated several times in the winter. Some persons have found it a good plan to tramp down the snow and wet it. It then forms ice, that often remains nearly all winter, keeping the ground warm, as well as keeping the mice off.

Downing, in his "Fruits and Fruit-Trees," says: "The following mixture will be found to be an effectual prevention. Take one spadeful of hot-slacked lime; one spadeful of clean cows'-dung; half spadeful of soot; one handful of flour of sulphur—mix the whole together with the addition of sufficient water to bring it to the consistency of thick paint. At the approach of winter, paint the trunks of the trees sufficiently high to be beyond the reach of these vermin. Experience has proved that it does no injury to the tree. A dry day should be chosen for the application."

Coal-tar has been recommended, but we advise great caution in its use, since many persons have destroyed their trees by it. We would sooner try a coating of strong alkaline soap; that, at least, would not injure the trees.

279. **Mice and Osage-orange.**—J. D. Cattell, of Salem, Columbiana Co., Ohio, says the field-mice are eating up all the roots of Osage-orange hedges in that region, so that they are utterly destroyed, and their cultivation must be abandoned unless somebody can give a remedy. He says:

"It has been my understanding, heretofore, that one of the greatest excellences of this plant for fencing was its freedom from all animal destroyers. If no remedy against the ravages of the mice can be found, it will be folly to set a plant of the kind in this part of the country. One of my neighbors has already given up half of his for lost, and grubbed out the balance. No doubt others are troubled in the same way. I have tried traps, terrier dogs, and poison, but all in vain. What shall I do?"

Who can tell?

We heard one nurseryman say that he should dig up an Osage-orange hedge, because it attracted mice, and also because it entirely exhausted the soil of a wide space, so that he lost the growth of one row of trees.

280. **Rats.**—This species of the genus *mus* is an almost intolerable nuisance in some portions of the United States. In fact, we do not know of any portion now exempt. They follow man into the wilderness. When we

located on the prairie, in 1834, about 15 miles from neighbors, and 40 miles out from what has since grown to be the city of Chicago, there was not a rat to seen or heard of. For several years we were exempt from this pest. There came abundance of shipping to Chicago, and with it abundance of rats, and they soon spread over the whole land, multiplying and devastating. Now they are great pests in the barns and stacks of prairie farmers.

Our common breed is called "Norway rats," from the supposition that they originated in that country. British naturalists, however, assert that they were introduced into the British Islands from India. If they are tropical animals, all we have to say is, that they easily adapt themselves to a rigorous climate, where they multiply at a most prolific rate. What we are yet to do with them is a problem not easily solved. All the receipts to cure the nuisance are only preventive, not eradicative.

281. **Rat Antidotes.**—A correspondent of the *Gardener's Monthly* says: "I tried the effect of introducing into the entrance of their numerous holes, runs, or hiding-places, small portions of chloride of lime, or bleaching powder, wrapped in calico, and stuffed into the entrance holes, and thrown loose by spoonfuls into the drain from the house. This drove the rats away for a twelvemonth, when they returned to it. They were again treated in the same manner, with like effect. The cure was most complete. I presume it was the chlorine gas, which did not agree with their olfactories."

Another correspondent writes: "Some four or five years since, my cellar became musty, to overcome which my wife sprinkled a solution of copperas (pretty strong) over the bottom. Since that time we have seen no sign of rats about the house, notwithstanding there have been plenty of them about the barn and other buildings on the premises."

Arsenic is considered, by some who have tried it, a failure, when used for the purpose of clearing premises of rats, because they are too cunning to partake of it after witnessing the death of two or three of the family. It is effectual, if the vermin will take the bait.

Strychnine we consider far preferable, and although so much more costly, it requires but a few cents' worth to do the work of death upon a hundred rats. It is also the very best thing to use upon a troublesome dog or cat that comes prowling about your premises. One grain for a dose is sufficient. We have killed numerous wolves by inserting one grain of strychnine in the center of a piece of fresh meat, just large enough for a mouthful for a wolf. As rats do not bolt their food, it is a little more difficult to get them to take strychnine, it is so intensely bitter. If it is mixed with corn-meal, and a few drops of oil of anise are added, it will attract the rats.

Tarring and feathering rats, and then letting them run, has been practiced, to give the tribe a hint that it would be well for them to leave. One rather smart individual, not having tar, used spirits of turpentine. He was going to drive the rats out of his house cellar. He was entirely successful; for when he let the rat loose in his kitchen, with a "Shoo!" to it to go down the cellar stairs, it took the kitchen fire in its course, and then a pile of flax that lay in the cellar way. In two hours there was not a rat in the house, unless it might be a roasted one.

Plaster of Paris has proved a successful poison for rats; and it has the advantage of being quite harmless to have about the house. A tablespoonful of the flour of plaster, mixed in a cup of Indian meal, and slightly sweetened, will be eaten by rats, and kill them. A little grated cheese makes the food more attractive. Oil of anise would be still more so. In fact, by the use of it, rats may be coaxed out of a house to eat poison, and die where their dead bodies would not be a nuisance.

Phosphorus, powdered and mixed with meal, a few grains to a teacupful, has been often used successfully as a rat poison.

Powdered potash, strewn in the paths frequented by rats, has been known to drive them away from a house. The theory is, that it gives them very sore feet, and disgusts them with the place.

282. **English Rat-Catchers.**—In England, rat-catching is a profession, sons often following it as the business of their fathers. The rat-catcher visits a farmer, and contracts with him at so much a head for all the rats he destroys. His trap is a large bag, which is set with the mouth open, baited with a piece of bread scented with oil of anise and oil of rhodium, the scent of which attracts the rats, and thus he bags enough to fill the contract. He does not desire to rid the premises, as that would "spoil business." A rat-destroyer would not be tolerated by the honorable company of rat-catchers.

283. **Rat-Traps.**—Among the many devices for trapping rats, we will mention a few of the best. A large wire cage-trap, where the second rat will go in because he sees the first in there, often proves successful. A large brass kettle, half full of water, with a small stone island in the center, just big enough for one rat to rest upon, the top of the kettle being covered with parchment, similar to that of a drum-head, having a cross cut in the center, is a first-rate trap. Fasten a small bait upon the points of the cut, and the rat jumps down from a board arranged for the purpose, and through he goes into the water. He scrambles on the island and squeals for help. Another hears him, and comes looking around, sees the bait, jumps for it, takes the plunge, and goes down upon the other fellow's head. Then comes a scramble for place, the strongest pushing the weakest off to take his chance in the water. This muss, as with men, attracts others, and in they go. We have heard of twenty in a night thus inveigled to destruction.

A barrel, one third full of water, with an island, the surface covered with chaff, and a bait suspended over it, we have been told, is an excellent trap.

Ferrets and weasels have been highly recommended to be kept about the barn, to drive away rats. The objection to them is, that they drive away the poultry also. Ferrets have been trained so as to be obedient to the call of their master, and used not only to hunt rats, but to drive rabbits out of their burrows.

284. **Domestic Cats.**—Perhaps the best thing for a farmer to do, who is troubled with rats, is to multiply his stock of cats. We knew one farmer

who kept fourteen cats, keeping up that number for more than a year, by which means he got rid of all annoyance from rats, and they also hunted the rabbits out of an adjoining grove.

The variety of the *felis* tribe known as the domestic cat, once wild, easily gets wild again if neglected by man, and is then as great a pest as the rats, and is given to the very bad habit of eating eggs and chickens, and catching pigeons and other birds.

To *prevent cats killing chickens*, Harriet Martineau gives the following as a sure preventive both against the killing of chickens and birds by the cats: "When a cat is seen to catch a chicken, tie it round her neck, and make her wear it for two or three days. Fasten it securely, for she will make incredible efforts to get rid of it. Be firm for that time, and the cat is cured—she will never again desire to touch a bird. This is what we do with our own cats, and what we recommend to our neighbors; and when they try the experiment, they and their pets are secure from reproach and danger henceforth. Wild, homeless, hungry, ragged, savage cats are more difficult to catch; but they are outlaws, and may be shot, with the certainty that all the neighbors will be thankful."

The abundance of food and shelter obtained by the domestic cat makes them much more prolific than in a wild state. She is generally, though very tame and gentle, much more attached to the house than to its inmates, which is quite the reverse with the dog. There are some remarkable singularities about cats. Gentle as they appear, they are very nervous, and easily startled, and act for a moment as wildly as though never tamed. They are also accused of being very treacherous. Their affection for their own species or ours is certainly doubtful. Their conduct at times, when a member of the family dies, is singular. Their anxiety also to get at a corpse has led to curious superstitions. In the opinion of the superstitious, the black cat has ever been attendant upon witchcraft. It is our opinion that a portion of this black-cat superstition originated from the fact that the hairs of a black cat exhibit sparks of electricity to a remarkable degree, when the atmosphere is in the right condition. To see this, take such a cat into a dark room, upon a clear, cold November night, and stroke the fur the wrong way, and if you never have seen it before, you will be surprised at the effect.

Cats, particularly females, are generally very cleanly animals to keep as house pets. They are fond of warm quarters and soft beds, and their song of satisfaction, called purring, is very pleasant to all who have a fondness for cats. We have known this fondness become a cat mania.

We look upon cats as a necessary part of farm stock, and they should be properly treated as much as any other kind of animals.

285. **Dogs.**—If there is any more unmitigated nuisance in a farming community than dogs, such dogs as farmers generally keep, we are unable to name it. In the country where we live, there are some hundreds of farms better fitted for sheep husbandry than any other purpose, but upon which no sheep are kept, because the country is so full of worthless dogs. The

country might be a hundred thousand dollars a year richer, if the people could stock their farms with sheep. A man who keeps a worthless cur to prowl through a neighborhood, is neither a good Christian, moral man, nor good neighbor. He does not do as he would be done by. A well-trained terrier is the only kind of a dog that is useful to farmers in general. Of these there are several varieties; the best is the wire-haired terrier, an ugly-looking brute, but a ferocious enemy to rats. The black-and-tan terrier is a handsome and more agreeable-looking dog to have about a place, and a good ratter, when trained, but does not have such an apparent natural propensity to destroy rats as the wire-haired one. He is also, for his size, a very strong dog, and knows nothing about fear of anything, and is therefore a very good house watch-dog. But we do not believe a farmer ever should keep a dog for his services alone, as a watch or guard of his premises. A dog to be worthy of a home upon a farm should have several good qualities combined. No conscientious man can keep a dog when he knows that the keeping of such dogs, whether his particular one or not, has a tendency to prevent the keeping of sheep; for sheep, of all animals, have greater adaptation to the purpose of furnishing the poor with cheap food than any other domestic animal in use in this country, and they are capable of converting the coarsest herbage of the farm into the most healthful meat of the shambles.

286. **Shepherd's Dogs.**—Whenever sheep are kept in such numbers as to constitute a considerable flock, the owner can well afford to keep a good shepherd's dog. One who has never seen a well-trained shepherd's dog can form no idea of their extraordinary sagacity and usefulness. We have ridden leisurely across a wide prairie in a wagon, accompanied by a Scotch colley, half-breed slut, driving five hundred sheep better than three men could have done without a dog.

If there were none but such dogs in the country, there would be ten times as many sheep kept. One man would be entirely competent to manage a thousand. He should have two dogs, so that they would be company for each other, and so that, in case of accident to one, the other would remain serviceable.

The Scotch colley very much resembles a prairie-wolf, having a broad forehead and pointed nose. The ears are short and upright, the fleece shaggy and slightly curly, with a bushy tail. These dogs are very intelligent, docile, and faithful, and possess an instinctive sagacity in everything that relates to the care of sheep. In a pleasant little book called "Anecdotes of Dogs," some wonderful evidences of the sagacity of Scottish shepherd dogs are to be found, and they should be read by all farmers' boys.

The English shepherd dogs vary considerably in appearance from the Scotch. The hair is smoother, and they do not appear so distinct a breed as the other. Both are of medium size, perhaps about fifteen inches high. The Irish shepherd dog is larger and more ferocious; some of them would tear a man sadly, if he interfered with the flock at night while in charge of the dog. The Scotch dog is always gentle, and generally very affectionate. In France, the shepherd dogs are somewhat like the Scotch, but smaller. The Spanish shepherds have a breed of dogs peculiar to that country. They are the size of a full-grown wolf, with large head, thick neck, mastiff-looking, fierce and strong, and are often armed with a spiked collar, to make them more formidable to dogs, wolves, and bears, if they should attack the flock. Their color is generally black and white—their daily rations two pounds of black bread, with milk and meat when it can be had. In Spain, the great flocks of the country, always in charge of shepherds and dogs, make long migrations every year from their lowland home to the mountain pastures, two or three hundred miles distant, feeding all the way in the roads and commons.

Sheep are the wealth of Spain, and without the aid of shepherd dogs, that wealth, under the present system of management, could not be produced.

287. **Dog Laws.**—In New Jersey there is a dog law which should be entitled, "An act to encourage the keeping of the most ordinary breeds of sheep, and no others, and to induce owners to have them killed by dogs." This act provides that all sheep killed by dogs shall be paid for out of the public funds, at five dollars a head. To improve your flock, if you get a buck worth a hundred dollars, and the dogs kill him, you get five dollars. If your neighbor has one killed that you would not have on your farm, if paid five dollars for taking him, he gets five dollars. It is not a law to encourage improvement in sheep-breeding.

The number of sheep annually killed by dogs in Ohio has been ascertained by the assessors. The number and value are astounding.

Thereupon a correspondent of the *Ohio Farmer* says: "Shall we have a dog law, or must we give up keeping sheep? That is the real question. There would be kept fifty per cent. more sheep in this country, but for dogs; not that quite that amount are dogged, but most farmers lose some, and this, with other risks, discourages them, and compels them to abandon the business. Now let every farmer make this a test question in the elections this fall. Let it be SHEEP *vs.* DOGS, and let all Republicans and Democrats see to it that every man put in nomination for the Legislature is sound on dogs. Let the candidate choose whom he will serve—sheep or dogs. I am in earnest, Mr. Editor. The sight of a few fine Leicesters, each worth more than all the dogs in Ohio, mangled and torn by worthless curs, who are only kept because their owners are too lazy to kill them, has made me in dead earnest; and wo to the Ohio legislator, if he depends on my vote, whose fear of dog constituents shall induce him to oppose or dodge a severe dog law! Now is the time, wool-growers of Ohio, to look to this matter, and see that anti-dog men are put in nomination by your respective parties."

There is no use in talking about taxing dogs. The dogs that really do the mischief are the dogs of gentlemen of elegant leisure, who are too lazy to hunt with them, and of the democratic loafer, who don't like to work, but glories in the luxury of a house full of children and a dozen dogs. Honest working people, who earn their bread, don't keep worthless dogs about them; if they keep a dog, they feed him, and train him up properly; but your roaming worthless vagabond will keep a score, and expect them to take care of themselves. But these fellows have votes, my dear sir; it will never do to tax their dogs. They would kick up such a dust about our ears that we could never find our way into the State-house again.

288. **A Trap for Catching Sheep-killing Dogs.**—Make a pen of fence rails, beginning with four, so as to have it square, and as you build it, draw in each rail as you would the sticks of a partridge-trap, until your pen is of sufficient height, say five feet. In this way you will construct a pen that, when finished, will permit a dog to enter at the top at pleasure, but out of which he will find it difficult to escape, should he have the agility of an antelope. All that you have to do to catch the dog that has killed your sheep, is to construct the trap where the dead sheep is left, as directed, as soon as possible after an attack has been made on your flock; put a part or the whole of a sheep that has been killed in it, and remove the balance to some other field. In a majority of cases the rogue and murderer will return the succeding night, or perhaps the next, and you will have the gratification next morning of finding him securely imprisoned. Some may object to the plan, perhaps, on the ground that you might catch an innocent dog. If he is so, he can content himself with not trying it.

289. **A Sermon on Dogs.**—The *Texas Christian Advocate* gets off the following short sermon upon dogs, from a text to be found in Philippians iv. 2—"Beware of dogs!" Upon this the preacher says:

"The Apostle well knew the mischievous and meddlesome spirit of dogs. Hence his caution against them.

I. Dogs in general are a nuisance.

Because:

1. They excite fears of hydrophobia.

2. They worry and destroy sheep.

3. They disturb our slumber.—Howling in horrid concert under our window, simultaneously baying at the moon.

4. They frighten us when out at night.—A snap or growl at a neighbor's gate, or when turning down a dark alley, has a wonderfully nervous tendency.

5. They are too familiar.—Will sleep on the front gallery, scatter fleas, come into the dining-room and parlor, and go to church on Sunday mornings.

From these and other considerations I observe:

II. All dogs should be watched.

1. To prevent their depredations.—Killing neighbors' cats, tearing pants, scaring children, and going mad.

2. To correct their bad manners.—Teach them they are only dogs, and not quite equal to "white folks."

3. Keep them in their places.—Wherever else they belong, I question as to the propriety of their getting between the sheets with gentlemen, or using the church as a dog-kennel.

APPLICATION.—Have you a dog? Then keep him in a dog's place, and watch him. If you admit him to undue familiarity, don't forget that other folks will still think him to be but a dog. If he has a shaggy coat and turn-up nose, these will not entitle him to the privilege of following you to church and disturbing the worship of the entire congregation.

Though he may be as nice and sensible as his fond master or foolish mistress, it is not very probable the preaching will do him any good. The intelligent fellow might be allowed the pleasure of trotting across the floor, and barking his approbation at the occasional flights of the preacher's eloquence, were a dog's gratification more important than the people's edification.

Hence, in conclusion, I would say, Beware of dogs! and what I say to one I say to all, Beware of dogs!

Finally, to the sexton, or that good brother who raises the tunes, I would say with emphasis, Beware of dogs! and if those canine interlopers persist in coming to the place of worship, just take them out and cut off their tails close to the ears."

290. **Rabbits—To Prevent Gnawing Trees.**—The American Hare, commonly called Rabbit, is common to all the Atlantic States and Canada. It is used for food by most people, but abhorred by others. Although clothed in a thick coat of soft, whitish-gray fur, the skin is not valuable, because it is too tender to be serviceable, and the fur is not much, if any, better than cotton, for such purposes as fur, separated from the skin, is used for. These animals are prolific, and generally prefer to live in and about farms that have been suffered to grow up badly to bushes. They do the most of their feeding at night, and farmers generally do not feel any dread of their mischief. Nurserymen do; and so do those who plant young orchards near where rabbits abound. When hunger presses them in winter, they will gnaw apple-trees with tender bark so as to destroy them. Young nursery trees are often cut off by rabbits so smoothly that one not knowing how it was done would suppose it was by a knife.

To prevent the depredations of rabbits, English nurserymen dip rags into melted brimstone, and fasten them about among the trees. The remedy mentioned in 278, to prevent mice, is recommended to keep the rabbits away. Some persons have daubed their trees with grease scented with some offensive odor, and found that rabbits would not touch them. Some have plastered them with fresh cow-dung. A very good remedy is to offer a bounty for every rabbit killed in the neighborhood.

Where trees have been injured, it is a good plan to bind up the wound with a plaster of clay and cow-dung, made plastic enough to adhere well; this, when firmly bound on, will often save a valuable tree.

Domesticated rabbits, if suffered to run at large, are very ornamental, particularly if of the finest fancy sorts, but they are sometimes unpleasantly mischievous. Where they can be conveniently kept under restraint, we have no doubt they can be made as profitable as poultry or other small farm stock. In England, rabbit-breeding is quite a business, and men of wealth and good standing engage in it, and form rabbit clubs, and exhibit their stock for prizes. Some of the specimens imported from London, that we have seen, were very beautiful. Some years ago, Francis Rotch, of Butternuts, Otsego County, N. Y., imported some of the best we have ever seen, and bred them to a considerable extent, finding ready sale for all he chose to dispose of in that way.

We do not know of any large establishment in this country where rabbits are bred for sale in market for food. The common American wild rabbit is often seen in the New York market.

Rabbits may be kept in very inexpensive hutches, and in tolerably close confinement. Their feed in summer is clover and various green things. In winter they will eat grain, sweet apples, parsneps, and other roots, cabbage, and a little sweet hay. A full-sized rabbit wants about a gill of oats night and morning, with a piece of rutabaga or parsnep, or its equivalent, say a quarter of a pound a day, and a little handful of hay. A doe, while suckling her young, which is most of the time, should be fed high, say three gills of oats a day, or wheat shorts, or pea meal, and roots and hay. Or in summer, upon almost anything that grows green, if given fresh.

A dozen or fifteen years ago, we remember having seen in "The Boy's Own Book" an elaborate treatise upon rabbit-breeding, and to that we refer the boy who reads this and desires to go into the business. They will also find frequent hints in agricultural papers, and in several books devoted to fancy poultry breeding. From what we have said of the food which rabbits consume, it will be easy to calculate whether keeping them will be profitable.

Newspapers bound around trees, it is declared in an article before us, will wholly prevent depredations of rabbits, and also keep off the borers, and a wrapper well tied on will last for months. The writer says:

"I find no other remedy necessary for either rabbit or borer. The wrappers, if properly put on, keep whole through all the changes of our variable winters. The trees are thus secure from damage by the rabbit. In the latter part of spring and early part of summer, when the beetles of the *Saperda* and the *Buprestis* are about, a few eggs will be deposited in the axils of the lower branches of trees, and at the tops of the paper wrappers. Even these points of attack, however, can in general be successfully guarded, by simply depositing a small piece of brown soap in the main axils, after the season's growth is well started, to be dissolved and washed down the stem by subsequent rains.

"But I do not find it necessary to resort to this precaution; for if eggs are deposited at those points, I am certain to find the fact out, and make all right the latter part of August and first part of September, when I go among my young trees with a bucket of strong soap-suds and a hard scrubbing-brush, for the purpose of giving them a good hard wash, such as would make some people open their eyes with astonishment, and cutting out suckers or small shoots that may have pushed through the papers, and renewing the wrappers."

291. **Squirrels and Gophers.**—All of our Eastern and Northern readers will understand about squirrels, and how much mischief the smallest of the family does in the corn-field; but they know nothing of gophers—they belong to the West. In California they are almost intolerable, and it is about as hard to devise a plan to get rid of them as it is here to get rid of the "chipmucks" (*Tamias tysteri*). In our opinion, the best way to prevent them from digging up the seed-corn is to give them plenty to eat on the surface. What is half a bushel of corn sown broadcast for the squirrels to pick up? It would save the seed of a large field harmless. We would willingly give that every year to see the dear little things around a farm. It is worth that to see the old dog chase them, and "bark at the hole" where one ran through a stone wall. We have concluded never to kill a chipmuck. If others wish to do it, they may perform the work by poisoning corn, or they may prevent them from eating it by coating the seed with tar, which is done by mixing a pint of tar in a pail of warm water, and putting the corn in it; then, to make it pleasant to handle, roll it in dry plaster. If a little flour sulphur is sprinkled on the wet seed, it will adhere and give it an odor that all little pests dislike.

At the West, in woody districts, gray, black, and fox squirrels, particularly the first named, are sometimes very destructive to the corn-fields in autumn. The gray and black squirrels increase so rapidly after one or two seasons of an abundant supply of beech-nuts, that the regular squirrel-hunts do not appear to diminish their numbers. They are to some extent migratory, as their supplies change, from beech to oak lands. At such times the strong and healthy will swim large rivers, and uniformly take one direction, leaving the young and feeble at home.

In Ohio, about the year 1835, squirrels became so numerous over the whole country as to threaten the entire destruction of corn-fields while in the milk. The following year they were all starved. In the winter they ran desperately over the fields, indifferent of danger, sometimes feeding upon the bark of the beech.

The red and striped or ground squirrel are not liable to suffer from these vicissitudes, as they lay up a store for winter. I think the flying squirrel does also, but this is a nocturnal creature, and less is known about it. There are also several kinds of winter birds which deposit seeds in knots and loose bark of trees for winter use.

The fox squirrel is the largest of the American species. It is of a reddish-gray color, and inhabits the prairie groves of northern Indiana, Michigan, Illinois, Wisconsin, and other States. It is very shy of man, is hard to get a sight of, and difficult to kill.

292. **Striped Gophers** (*Spermophilus tridecemlineatus*).—Perhaps, when you see the name given to this animal by natural-history writers, you may imagine it is as big as its name. But it is not half as formidable to look at. We give the scientific name for identification, because the word "Gopher," in Florida, means a small land-turtle. In Wisconsin it means a squirrel somewhat like a chipmuck. In California it represents a different animal.

The striped gopher abounds in the Northwestern prairie region. In the first settlement of the country a hundred miles around Chicago, it inhabited all the prairie groves and dry ravines. The following is its description: The ears are short and rounded; the tail slender and hairy, about half the length of the body; the body is of a dark brown above, longitudinally marked with alternate rows and spots of a light fawn-color, which correspond nearly with the belly and sides. The lighter lines on the upper part may be distinguished by the brown intervals between, which are occupied by the single rows of light spots, which are generally indistinct on the anterior half of the body.

Although these animals are considered grain-eaters, and called mischievous, we believe they are among the many real friends of the farmer. Like the weasel, which occasionally eats a chicken for lack of more favorite food, the gopher sometimes eats the farmer's seed-corn, but he should not be condemned as an enemy for that act, without a fair hearing.

There may be some of the gopher family that are destructive of farm crops. The evidence is very strong to that effect against the Californian gopher, which lives in holes all through the cultivated fields, and does not seem to be very particular what it eats, whether corn, wheat, potatoes, beets, melons, pumpkins, so that it is something which the farmer has grown for his own use.

It is not so with the small striped gopher. This beautiful little animal should be carefully preserved upon all farms where it now exists, and we have no doubt it would prove a valuable addition to the stock of any farm where it is not found in a natural condition. It is a great destroyer of field-mice, and in our opinion a whole troop of gophers do less damage in one season than the mice which one of them would kill in a single day. For they are real epicures, eating nothing but the blood and brains, when the supply is abundant. These animals have such an appetite for flesh, that if deprived of it, a mother will eat her young. Such carnivorous animals must be better hunters than cats, and should be carefully preserved, and not "drowned out," as they often are, when their homes are discovered by the boys, just for the "sport" (cruelty) of killing them. These animals seem to have a natural instinct that man is their common enemy. We have seen them often in situations where they could never have had any acquaintance with man, at least *civilized* ones, who are the only ones who ever kill such small game for "sport," and we found them wild in the extreme. They utter a cry when discovered, and dart away into some shelter with great rapidity. In this respect, quite unlike the chipmuck, which will play around a dog or man in the most tantalizing manner.

The striped gopher never gnaws trees, roots, fruits, nor green vegetables, and in fact does the farmer no damage except to eat a little seed-corn. For all that they eat in the harvest-field, they save twice as much in driving away mice and squirrels. Chipmucks, red squirrels, and mice can not inhabit the same locality with gophers; and yet there are persons who have offered bounties to have them destroyed. Let such learn this fact from this volume, if they learn no other, that the striped gopher is worth its weight in gold upon any farm where field-mice are so abundant that they destroy fruit-trees.

293. **Skunks.**—We don't know that we can afford to stem the current of popular opinion so far as to recommend the protection instead of destruction of skunks (*Mephitis Americana*). We are aware that these animals are troublesome visitors to the poultry-yard, and on that account they are hunted and killed without mercy, and without a thought about what they live upon all the time that they do not eat chickens. As they are flesh-eaters, they must find something of the flesh kind to eat, and that something is the very thing that the farmer is most anxious to get rid of—it is mice, and worms, and bugs. The quantity of these pests destroyed by a single skunk is enormous. It is very rare that they come about a house, though we have known them to live for weeks in cellars, or store-rooms, or under a crib, without producing any nuisance. They never emit their fetid odor unless attacked by man or dog; and it has been contended that it was practicable to domesticate a skunk so that he would be quite a harmless pet. We can not recommend making pets of these animals, but we do recommend farmers to learn the important fact, that if they do him a little damage occasionally, they also do him an incalculable amount of good. Generally speaking, there is not a farmer in all the region inhabited by the *Mephitis* who could not well afford to exchange dogs for skunks, and pay ten dollars each for the bargain. There is one other thing that skunks are good for. As an article of food we don't think there is any wild animal that makes a more dainty dish, and we hold that we are tolerably well qualified to judge. A fat skunk, nicely dressed and roasted, hung by a string before an old-fashioned wood fire till beautifully browned, and then served upon a platter flanked with boiled mealy potatoes, covered with the brown gravy made of the fat drip, is beyond dispute "a dish fit to set before the king."

294. **Toads.**—Although not among the quadrupeds, of which this chapter treats, toads are among the friends of the farmer, and as such should have a place in this connection. Every man who owns or cultivates a garden or field, who knows anything about the natural history of the toad, will never allow one to be destroyed. There is no animal more harmless, and few that do the farmer more good than toads. Their whole food is of insects injurious to the farmer. The prejudice against "the ugly things" is a foolish one, and should be done away with. We once had a toad in the garden which, by some particular mark, was known to the children, who called it "father's pet toad," because it really appeared as though it knew that we were its friend and protector. This toad came year after year to lend us its valuable aid in exterminating the insect pests of the garden. We had another that made the milk-room its summer home, where it was constantly engaged in catching flies and bugs. Toads and bats should both be protected from harm, and children taught to encourage them to come about the house. Bats are great insect-eaters, and never visit the house of an evening for any other

purpose than catching insects for food. It is charged against them, that they sustain bed-bugs as parasites.

295. **Camels—Their Introduction into the United States.**—It is a great jump from the back of a toad to that of a camel, but not so great as politicians sometimes make. As we have to make the leap somewhere, it may as well be done here as anywhere, and after a very short ride we will jump down again upon the back of a goat. We have introduced camels, because we want all, particularly the farmers' boys who read this book, to learn the fact that camels have already been introduced into the United States, and put to service as beasts of burden. The first imported were in 1857, we believe, under the auspices of the general government, since which time they have been in active government service, principally in Texas, and have made one or more trips to the Pacific with army officers.

The Galveston *News* gives the following account of the strength of one of the camels. It says:

"There were near a dozen on the wharf, of all ages. The camel loaded was one of the largest. On the word of command being given, the camel lay down, ready to receive his load, which consisted of five bales of hay, weighing in the aggregate over 1,400 pounds, which was firmly bound to the pannier placed upon the animal's hump. Upon the utterance of command by the native keeper, the huge animal arose, without any apparent effort, to his feet, and walked off in a stately manner along the wharf and through the city. We were informed that the same camel had 1,600 pounds placed upon him, with which enormous weight he arose. The animals are all exceedingly tractable, and seem to possess much affection for any one who treats them kindly, as an example of which Mrs. W. informs us that one of them, a pretty white one, which she had petted, would always kiss her when she was within kissing distance, which fact, we really thought, certainly proved the animal to possess an excellent taste as well as an affectionate disposition. In their native country the average load for a full-grown camel is some 800 pounds, with which they perform their long journeys over deserts, with but little food or water."

It is to be hoped that camels will become one of the ordinary beasts of burden in this country, where there are such vast arid plains, as in northern Texas, New Mexico, western Kansas, and Utah, that no other animals can traverse them.

It is stated that the Emperor of Brazil is about to introduce dromedaries into that country. This animal can go long journeys without water, and therefore will be found valuable upon some of the deserts and plains of that country. A common load of an ordinary dromedary is 500 pounds. One of the camels in Texas has carried two bales of cotton, of 500 pounds each. One of the best kinds of dromedaries for riding can travel 400 miles without stopping to eat, drink, or rest.

At the North, where horses, mules, and oxen are in such common use, we do not think that camels will ever supersede them.

296. **Goats.—Introduction of the Cashmere Goats into the United States.**—About the most unprofitable of all varieties of farm-stock is the common goat. It is known in some parts of the country as the Irish goat, probably because the people from Ireland in this country, particularly in cities, keep more goats than all the rest of the inhabitants. These are of all colors, as much so as the common breed of horned cattle, and about the size of common sheep. The she-goats give a small quantity of milk, and the kids afford some flesh food, at a small cost to the owners, as they forage their living, and frequently do more mischief in a neighborhood or upon a farm than their necks are worth. The hair of the common goat is worth nothing for manufacturing purposes. It is quite the reverse with the Cashmere goat. The fleece of this variety is eight times as valuable as fine wool; and, fortunately, it has been found that a cross upon the common goat, even in the first progeny, produces a fleece about half as valuable as the full blood, so that the breeding of goats in this country for the fleece is likely soon to become quite common, and a profitable branch of husbandry, particularly in some of the roughest districts of country.

To Dr. James B. Davis, of South Carolina, the country is indebted for the introduction of the pure Cashmere goats, which are now to be found in various parts of the United States; and to Hon. Richard Peters, of Atlanta, Ga., it is equally indebted for the interest he took at an early day in the propagation of the original stock, which he purchased of Dr. Davis. Mr. Peters, being a wealthy, public-spirited gentleman, spared no pains, even when success was doubtful, in getting this breed established upon a firm basis, and proving that its crosses upon the common breed would be profitable, as well as upon several other varieties of fine-wooled goats.

We had the pleasure of an acquaintance with Dr. Davis and his stock at Charleston, in 1849, shortly after his return from several years' residence at Constantinople. He brought with him seven females and two males of the Cashmere goats, besides several other curious specimens of the livestock of the East. He stated his belief to be that the Cashmere, Persian, Angora, and Circassian goats are all of one breed, and that they have been slightly changed by locality, principally by altitude. These fine goats usually breed two kids in the spring, and, unfortunately, where rapid propagation is an object, the males preponderate.

The progeny of these goats is now to be found in all the States from New York to Texas. In the latter State they have been established pretty extensively. We saw a letter written by John R. McCall, at Austin, in August, 1860, which estimated that two hundred head, principally bucks, had been introduced into Texas.

The demand for the fleece of Cashmere goats may be calculated from the fact that it is stated that 4,000 looms and 12,000 people are employed in the city of Lyons, France, in the manufacture of the fleeces of Cashmere goats, and that they are worth from four to eight dollars a pound. As soon as the supply is large enough, we shall have manufactories in operation in this country.

Cashmere shawls were exhibited at the Crystal Palace, New York, valued at one thousand dollars each. These were all made by the needle. Fabrics made of Cashmere goat's fleece, it is supposed, will outwear those made of any fibrous material yet discovered.

The Thibet goat, one of which we saw at Dr. Davis's, differs from the Cashmere materially. The outward appearance is that of a very coarse-haired animal; but there is an under-coat of long, white, silky wool, which weighs about a pound when combed out. Dr. Davis thought this like the wild goat of the Rocky Mountains. Who knows if they are identical?

Dr. Davis imported, also, the Scinde goat, which comes from Scinde, at the mouth of the Indus. This was a remarkably large goat, with monstrous pendulous ears.

A goat used in Malta is the best milker of the family. A good ewe gives a gallon a day. Goats' milk, in all Eastern countries, particularly in malarious districts, is considered more healthy than the milk of cows; and some learned physicians in this country declare that cows' milk, in malarious districts, is the moving cause of many attacks of bilious fever. In this view of the subject, it may be well to inquire whether it would not be to the advantage of the people, in a sanitary as well as pecuniary point of view, to introduce the improved breeds of goats into all sections reputed subject to malarious diseases.

297. **Breeding Fish for Food on the Farm.**—We do not feel willing to close the chapter upon animals on the farm, without calling attention to the subject heading this paragraph.

Fish are the least costly food that man can obtain; yet, owing to the scarcity, the labor of taking them out of the water—which is all the expense attending their production—has become so great, that fish are sold in our market at nearly as high a price per pound as meat. Salmon are really higher than choice cuts of either beef or mutton. And yet salmon can be grown at very trifling expense.

We have long been producing oysters by artificial means, without which our market could not be supplied; and yet, with that fact before our eyes, very few attempt to produce fish by an equally easy process. One fact of importance, in proof of the benefit of simply protecting fish from being taken in the spawning season, is the following:

"In the river Foyle, in the north of Ireland, by a steady perseverance in a proper system of protection, the amount of salmon taken was raised from an average of 43 tuns annually, in 1823, to that of 300 tuns in 1842; while in the small river of Newport, in the county of Mayo, in which the salmon was formerly unprotected by law, and consequently taken at all periods of the year, within three years after the introduction of parliamentary regulations enforcing their protection during the breeding season, the annual take was increased from half a tun of fish to eight tuns of salmon and three tuns of white trout, with a certainty of a still higher increase.

"In view of the great augmentation in the price of all the articles of food and necessaries of life in this country, the small probability of any considerable reduction, and the actual sufferings of many of the laboring class from want of sufficient food, it appears to me that this subject is worthy of the closest consideration, and that any one who can suggest and effect the means of furnishing a new and ample supply of cheap, nutritious food, has some small claim to be thought of as not an entirely useless member of the community."

There is a little book, published by the Appletons, that gives in detail all the French plans for artificial fish-breeding, and any one who reads that volume can go to work and stock his own waters with any kind of fish he desires. That our natural supply has failed, there is not a shadow of doubt, and that it never will be replenished, except by artificial breeding, is equally indisputable. That a re-stocking of our waters with fish, so as to make them as plentiful as formerly, would prove one of the cheapest modes of lessening the price of human food, is just as certain.

In the West Indies, fish and turtle are constantly kept and stall-fed. At free running they never become fat, any more than our land stock. The ponds are constructed of stones, of irregular figure in wall, so as to retain three or four feet of water at the lowest tides. The water of the rising tide flows freely in. These ponds have a deck of plank over them, laid about two inches apart, for admission of air and light. A hatchway in the middle of the floor is opened to throw in their food, which usually consists of fry, or small fish, taken by cast-nets in any required quantity. When this is scattered among them, the excessive eagerness of the fish is an interesting sight—their bright eyes, fine teeth, and sparkling colors showing beautifully, as they leap out of water to catch the falling bait.

The housekeepers send for a suitable fish for dinner shortly before the time to cook it. The person has a strong line and hook, with or without bait; he lets it down, and the fish rush toward it, and he must be expert to let it drop to the mouth of the grouper, hamlet, snapper, white or blue band porgie, etc., which he wants. Such a fish never appears on the tables of the Northern States, and yet every town on our sea-coast ought to have them. As it is now, when the poor fisherman has caught more than he can sell, the overplus is a dead loss.

There is nothing more simple than the artificial breeding of fish. The entire mystery consists in taking the female during her time, and by running the thumb with a gentle steady pressure down her back, force out her ova in a jar of pure fresh water. The male is then taken in the same way, and made to yield a few drops of the spermatic fluid in the same vessel, the two are then stirred together for a few moments, and the contact of the fluid of the male has the effect to vitalize the eggs at once. The eggs are then laid down in shallow tanks with gravel bottoms, arranged in a series of steps so that running water can continually pass over them. The whole trouble of the breeder is then to keep the eggs free from any sediment or muddy deposit, and in due time each egg becomes a fish. Thus almost every egg in an innumerable ova can be turned to account for the benefit of man. There is, however, something to do after the eggs have become fish, and that is, to confine them within certain limits by a dam, until they are old enough to be able to take care of themselves, and make fight against the larger fish which would eat them up. There are now three or four establishments in the country for the artificial breeding of fish, and we see no reason why every lake and river may not be filled with life and food, and made to make an ample return for all investments.

The cultivation of fish in France and some other countries of Europe has become as much of a trade as any other occupation, and the results in supplying food and affording a handsome recompense to the owner have been equal to the most sanguine expectations. It is surprising that more attention is not paid to it in this country where the facilities are unsurpassed. Occasionally an individual makes a trial, but little however has yet been done in this line compared with what might be accomplished. A writer in a South Carolina paper gives a description of a domestic fish-pond on the plantation of Mr. Freeman Hoyt, Sumterville. Mr. Hoyt had a small stream of water which ran through a low place in such a form as to enable him, by a dam of some 50 yards long, to construct a pond of some 700 feet in length by 150 in width, with a depth varying from the shores to 12 or 15 feet in the center. This gave him a pond of over two and a half acres, where he could raise nothing. He deposited in the pond eight good-sized trout, and about 300,000 eggs, with a larger amount of smaller fish for the trout to feed upon, and in one year the water was literally swarming with the finny tribes. His trout one year old are some seven inches in length. The water running from the dam passes through a sieve, so that the fish can not escape from the pond. The necessary apparatus for cultivating, feeding, and taking care of the fish costs but a small sum, and the proceeds of the pond will be a source of much pleasure and profit. And this is but one instance in thousands which might with equal facility be turned into a source of revenue.

In many sections of the country numerous springs and streams abound, confined within narrow valleys, that may be converted into permanent ponds and thus be made to yield a profit in fish far beyond the capacity of the same area of the best of land devoted to the most profitable farm crops. These streams when supplied with living springs may be converted into nurseries of trout—the best of all fresh-water fish. The streams or ponds more sluggish in their nature may be made equally productive in a supply of still-water fish. This subject has been brought into extensive practice in France and other portions of Europe, and more recently a number of successful trials have been made in the United States to multiply domestic fishes, which may be as much at the command of the owner as the fowls in his barn-yard, affording an equal luxury and at a much less cost.

Of artificial propagation of fish in Scotland and Ireland, a late number of the Manchester (England) *Guardian* said: "As several reports have been circulated in the newspapers to the effect that the attempt to propagate salmon by artificial means in Ireland and elsewhere had extensively failed, we think it right to state that we have obtained some information from the very best sources, which convinces us that these reports are wholly unfounded. On the contrary, we are glad to say the success attending the first attempt at propagation on an extensive scale in the country has surpassed our most sanguine expectations. It is reported from Perth, where about 350,000 ova are nearly hatched, that everything has progressed most satisfactorily; the whole of the ova, with a trifling exception, seem in a lively state. The only difficulty appears to be that of providing sufficient ponds for such a multitude of fishes, when they are able to swim, as the feeding-ponds already provided will not contain one tenth of them; and such is the number, that there appears no other way, after having hatched and protected them for twenty weeks, but that of committing them to the river to take their chance. At Galway about 260,000 ova are in a similar prosperous condition. Propagation on a smaller scale has also been carried into effect on the rivers Tweed, Louchard, the Foyle, Bush Mills, the Blackwater, the Moy, the Dee, near Chester, and other places. By the use of spring water the spawn has been entirely protected from injury by frost, during the past severe winter; and of 2,500 eggs which were sent from Galway to Basle, a distance of nearly 1,000 miles, M. Lex states that a considerable portion are good, and in a state likely to live."

Robert L. Pell, of Ulster County, N. Y., has done a good deal to establish fish-ponds upon his farm; he says "that he is trying to grow the moss-bunker for manure, and hopes for success in growing them, but thinks the use of this fish the cause of disease in the districts where used. As many as 86,000 moss-bunkers have been taken in a seine at one haul upon our coast. Mr. Pell also has in his ponds the black bass of the lakes—a fish that grows as large as shad. Another fish from the lakes very much resembles the black bass, and flourishes in artificial water. Both do well, and are easily caught with a hook. The dace is a good fish for ponds, as he prefers still water. The rock bass is a common fish in Lake Champlain, and is much esteemed, and can be cultivated without difficulty. The muscalonge, from the lakes, is an excellent fish, and appears well calculated for artificial water if pure. This fish grows large, and somewhat resembles the pickerel or pike of the lakes. Mr. Pell has the stickleback, that curious little fish that builds a nest something like a bird. Haddock he has tried, but failed of success, notwithstanding he salted the pond. The haddock is much inferior to the codfish, although frequently salted and sold as cod. He also gave accounts of experiments with several other varieties, and how to transport fish alive safely. Mr. Pell thinks it is possible to stock all the streams in the country with fish, and thereby increase the food of the people to a very great extent, without any expense."

A writer in *The Homestead* says:

"Three years ago I constructed, in a ravine, a fish-pond covering a surface of about three fourths of an acre. It is fed by four small springs, and receives a large amount of surface-water from the slopes around. It is fifteen feet deep at the greatest depth, and has shallow bays and inlets, where the small fish may breed and find protection from larger ones. It contains a small island, and the shores are embellished with flags (*Iris*), water-lilies (*Nymphæ odorata*), and other water-plants. It was stocked with yellow bass, Oswego bass, white perch, and every variety of sun-fish and minnows, also a dozen gold-fish (*Cyprinus auratus*). And now, at the end of three years, it is astonishing to note the vast increase in my scaly family. They have multiplied by hundreds, and grown in size beyond all my calculations. The gold-fish number several hundred, some of them over a foot in length, and a few of them are beautifully marked with silvery sides and red fins, head, and tail; others with golden sides and black fins and tail. I had no idea that they would thus sport in colors, but certainly they are very beautiful. The other fish have grown so much that I intend to commence using them for the table in autumn. I have not fed these fish, except for amusement and to tame them, when a few crumbs of bread are thrown in from a small bridge connecting the island with the shore, and the fish called up like chickens. The sun-fish, gold-fish, and smaller fry soon learned to come at my call, and to follow me in great numbers, from one end of the bridge to the other, for their morning or evening meal.

"The young bass (the old ones hold back) and the sun-fish dart to the surface for their food, and have a lively scramble for it; the gold-fish pick up what sinks to the bottom. Their habits in this way are very much like a flock of chickens, for some of the smaller fish take their position immediately under my feet, to pick up the small crumbs that fall, in breaking the larger ones to throw out. Some persons ring a small bell to bring their fish up, but I prefer calling mine. They do not appear to come from a greater distance than about forty feet to any one spot. I feed them in several places, to note the varieties and their growth. Now, as to the utility of this pond, it furnishes ice for my own use and three or four of my neighbors who have ice-houses; it also affords excellent stock water, and will doubtless hereafter supply my table with fish. A small skiff on its surface gives many a pleasant hour of recreation to the young who are fond of rowing.

"The construction of this pond was very simple. The earth was excavated across the ravine four feet deep and five feet wide for a foundation; then stiff clay filled in and well pounded, to prevent leakage at the bottom. The earth from the bottom and sides of the ravine was thrown on the top of this foundation, to raise the embankment to the proper hight. A waste weir at one side, paved with flag-stones, and two feet lower than the top of the dam, sufficiently large to carry off the heaviest flow of water in very heavy rains, guarded by a wire screen to prevent the escape of the fish, completed the construction. It is now sodded over, and planted with willows at the foot, and is considered safe. The expense of making such a pond is small, and it adds much to the value of a farm."

298. **Trout Streams—Reasons for the Disappearance of Trout.**—One of the

very best authorities in the country—Geo. Dawson, a great lover of piscatorial sports—gives, in the Albany *Evening Journal*, the following reasons for the disappearance of trout from streams where they were abundant. He says:

"Every one who has lived a score of years in the neighborhood of mountain or spring brooks remembers when, in such and such a stream, trout were abundant, where scarcely one is now ever taken. 'What has become of them?' is a question which every one has been asked, or has asked himself, a thousand times. One says, 'They have been driven out by sawdust from mills erected upon the stream.' Another, who lives where tanneries have been erected, thinks 'the tan bark has killed or disgusted them.' Another says, 'Since the alders which used to border the creek have been cut down, and the forest cleared away, they have sought greater solitude.' Others say, 'They have gone because trout will not stay where there is a great deal of passing to and fro, as there necessarily is in a thickly populated locality;' and others still insist that 'they have all been fished out.' Now, in my opinion, not one of these reasons is real. Neither sawdust, nor tan bark, nor clearings, nor dense population, nor excessive fishing, is the cause of depopulation. Some of the very best trout streams that I know of are full of sawdust and tan bark. The bottom of Caledonia Creek is not only a bed of sawdust, but the creek lies in the midst of a dense population, and has been fished, night and day, for thirty years. Nevertheless, in its cold, crystal-like water, trout are more plenty to-day, and more are taken, than ten years since. I have been more than once surfeited with success in a stream in Canada where the sawdust was so thick that it formed a compact covering upon its surface; and every year I take trout from a little brook in Connecticut which has been cleared and fished for almost a century. There are three great causes for the depopulation of trout streams: First, the erection of establishments upon them in which lime is largely used; second, the introduction into the streams of pike or pickerel, whose voracity is, sooner or later, fatal to all competitors; and thirdly, and principally, the gradual change of the temperature of the water. Trout will not live long in water which is not, at all seasons, of a temperature which may not, in comparison with other water, be characterized as cold. Other causes besides those I have named sometimes operate; but, in ninety-nine cases out of a hundred, the changed temperature of the water is the cause of the absence of trout from streams where they were once abundant."

He does not give the reason of this change of temperature, but we do: it is just the difference between a cool forest shade and a broad expanse of hot sunshine. Where these mountain streams once were shaded from the first gushing spring to their mouths at some large river, they are now exposed to the full force of the noonday sun, until the water is heated to a degree as fatal to the brook trout as ice would be to a tropical plant. The streams that still retain trout are those which are so largely supplied with cold spring water that the temperature is kept at a healthy point, notwithstanding the denuded state of the land. Sawdust has no more effect upon the fish than rotting leaves and wood in the forest streams. The washing of cultivated fields, by which the water is made impure, has more effect upon fish of all sorts than sawdust, or, in our opinion, lime, in such quantities as result from any manufacturing establishment. This fact must be kept always in view in establishing artificial ponds for fish-breeding. Make them where the water will not be roiled by every shower.

299. **Eel Streams and Eel-Fishing.**—In all parts of the country where eels abound, they may be made an essential part of the food of the family in the autumn months, if the streams are such as easily admit the construction of weirs and placing traps or eel-pots. In some parts of the country the eel business affords no mean item of income to farmers who have riparian rights, the work not interfering materially with ordinary farm labor.

We find the following interesting account of the eel fishery on the Susquehanna in the Lancaster (Penn.) *Herald:*

"About the middle of August the water of the stream becomes very low, and usually by September that in the channel is only a few feet deep, leaving the stony bottom, for a wide space on either side, in some places nearly bare, with occasional deeper furrows which pass along it. At this stage of water, the instinct which governs the fish to descend the rivers previous to the advent of cold weather becomes the means of their destruction. For many miles of the river's length, therefore, north and south of us, the people owning the shore adjoining erect their fish-dams and gins, by deepening the channel somewhat, and building an elongated V-shaped wall, at the lower point of which is fixed a box, from which the fish, when once caught, can not extricate themselves. Obeying this instinct in their descent of the stream, they find themselves borne pleasantly in this channel, and, wriggling themselves cheerily, they let the current, pent in by the walls, carry them along until they tumble plump into the box at the termination of the V. The fish taken in this manner are for the most part eels, of which almost incredible quantities are captured during the fall season. Their 'run' only takes place during the night. In daytime they remain quiet in the comparatively deep pools of the river. The work of catching them, however, is no sinecure, not so much on account of the labor as of the wakefulness and exposure which it involves. In some of the dark and showery nights of the season the game will come into the box so fast that the watcher, who is often stationed there with a boat, can scarcely remove them into it with sufficient celerity. At other times there will be scarcely spoil enough in the boxes to repay the trouble in watching them. It is only the larger apparatus and dams, however, that are thus cared for, the smaller being rarely filled to overflowing. Fishermen secure and salt down some five or ten barrels of eels during the season, besides living entirely upon them during the catch. The larger operators make the business pay, as a single man alone can perform all the labor required in taking and salting the fish. We have seen various illustrations of digital dexterity, and also Ole Bull's manipulation of the violin, but could any rapid manipulator once behold the marvelous rapidity with which some of the fishermen divest the eels of their slippery epidermis or integuments, they would stand abashed, and, like the sable individual in the song, 'Lay down the fiddle and the hoe' forever afterward. We are at a loss to see how it is possible for any fish whatever to descend to the mouth of the river, excepting it be a few belated ones, who delay their return until a rise in the river gives them security from the low-water traps. From Marietta to a point perhaps 100 miles up, excepting in a few places, these eel-gins are so numerous that they must entirely empty the river of eels, the run continuing constantly until frost, and the fishing being terminated only, as we have already said, by the fall rains. When these occur, the boxes are taken up. The walls which remain under the water are very seldom disturbed, and the next year, with very little repairs, are just as good as ever. The eels are packed in full-sized barrels, and many are sent to Baltimore. Quantities are purchased by sea-going vessels, whose skippers are aware of the delicious flavor of this rather anomalous article of provision."

The kind alluded to in this extract is the "silver eel," which is also taken all along the sea-coast by hooks and spears, and sold in great abundance in all the city markets, at as high a price per pound as beef or mutton.

Now will farmers please to think that eels can be artificially bred as well as any other fish, and that there are a great many streams and ponds, particularly in the West, where there are no eels, which might be made to furnish a vast amount of food, as well for home use as for sale.

There is another kind of eels called lamprey, or lamper-eels, much esteemed in some places. This kind have no gills, but have sucker mouths, and breathing holes upon each side of the neck. These are found sometimes in great abundance in the streams of the Eastern States, in the spring of the year, and are easily caught by hand, by wading the shallows of the stream, where they are found clinging by their mouths to the rocks or large pebble stones.

The silver eels are also caught by wading streams at night, with torches and spears, during low water, after harvest. This used to be accounted great sport for the boys, when we were counted one. Many a good meal we furnished the family, also, by sitting an hour or two of a summer evening by the side of the mill-pond, with a hook baited with a small fish. This we mention to encourage farmers to take steps toward re-stocking their streams and ponds, as well as making artificial ones.

300. **Ancient Fish-Breeding.**—Lest our readers should suppose artificial breeding of fish is a "new-fangled notion," we state that it has been practiced in China many centuries; and it is probably a century since the matter attracted attention in Germany.

In that country fish-breeding has now become an extensive and profitable business. In France, also, there are many establishments, in some of which it has been demonstrated that salmon can be successfully bred in fresh-water ponds, from eggs obtained from salmon that come from the sea into fresh-water streams to deposit their eggs at the spawning season, without allowing the fish ever to swim in sea-water. And these young fish, it is found, will reproduce their species.

If what we have written should incite any one to undertake to make artificial ponds, or stock the natural waters of his farm with that kind of living animals which will give him the cheapest animal food that can be produced, he should first procure and carefully study the books already published upon this question, and, if possible, visit those who have had experience, such as Dr. Garlick, of Cleveland, Ohio, Robert L. Pell, of Ulster Co., N. Y., Messrs. Treat & Son, Eastport, Maine, E. C. Kellogg, Hartford, Conn., and many others.

As an article of diet, there is no mistaking the fact, gained by reading and observation, that it is conducive to health, and particularly that those who use fish as their principal food are exempt from scrofulous and tuberculous diseases. This alone should prompt artificial breeding of fish in this country.

PLATE XIII.

(Page 275.)

This picture in its two parts is allegorical, though drawn from an original. It is intended to teach. It should be studied with that object. Then it will convey its own lesson. If the residence of farmer Snug is most attractive, let every farmer strive to make his so, and keep it in that order. If the residence of farmer Slack is repulsive, let it be a lesson to every farmer's son.

After looking at this picture, placed as a frontispiece to Chapter III.—The Farmery—let him carefully read that chapter. It is full of instruction. This picture is not designed as an index to the contents of that chapter, but to tell its own story—a story of good and bad management. As you read, you will see how such a residence as this dilapidated one produces a debasing influence upon the minds of children, and what inducements you have to beautify home.

Farmer Snug's Residence,
during his life time

The Same Place Under Farmer Slack's Management.

CHAPTER III.

THE FARMERY,

DESCRIBING THE BUILDINGS, YARDS, WELLS, CISTERNS, AQUEDUCTS AND STRUCTURES NECESSARY FOR CARRYING ON THE BUSINESS OF THE FARM.

SECTION XIV.—FARM-HOUSES.

IN this section, the size, form and construction of farm-houses, and adaptation to the purpose for which they are designed, will be treated, and reasons given why they should be convenient, light, well-ventilated, airy in Summer, warm in Winter, and handsome, both in the interior and exterior. Here, too, all who need the information, will be able to learn how to build their dwellings so as to make them, without great cost, all that we have indicated.

301. **Influence of the Dwelling upon Character.**—"I will tell you the character of the man, if you will show me the house he lives in." This quotation embodies a volume of truth, and the fact should be impressed upon the minds of all farmers' children, as well those who live in such a house as that of Farmer Thrifty, as those in the tumble-down mansion of Farmer Slack. If they were born in one like the former, it is to be hoped that they received influences at the breast, that will always keep them out of one like the latter. If they were so unfortunate as to belong to the numerous family of Slacks, let it be impressed upon their minds that the character of a man is known by the appearance of the house he lives in. None but a "Slack farmer" ever lived through a lifetime in such a miserable dwelling place as some of our American farm-houses.

There is a debasing influence about a mean house upon the minds of children; while a good one, that has many points of beauty about it, makes them not only love to call it "home," but it always has an influence upon their minds to attract them away from places that might injuriously affect their morals, for it is a home that they love. Such a home also attracts proper associates for your children, to come and spend a pleasant winter evening, or a leisure day, under the parental influence, and will make them good men and women; and all because you provided for your family such a home as all American farmers' families should enjoy.

302. **Inducements to Beautify Home.**—One of the strongest and one of the most common inducements for the sons and daughters of farmers to leave the country for a city life, is the neglect of parents to beautify home, and teach

children to love it because everything around it is more cheerful, more beautiful, more pleasant, more enticing than any other spot known to them. Instead of this, it is certainly true that a very large portion of our farm-houses are, in almost every respect, exactly such places as children of intelligence, who chance to see or read of the attractions of other places, are most anxious to leave. To prevent the exodus of your children, the moment they get old enough to have ideas of their own, let it be one of the life studies of every parent to make the children sensible that their home is equal, if not superior, in all that serves to make life worth living for, to that of any other family in the same station of life. If your house is small, it is all the more easily painted, and made to wear an attractive outward appearance, and it is no good reason, because it is small, that its interior should be most inconvenient, uncomfortable and unattractive. Study to make your house such in every respect that your visitors will say, "What a lovely place," and you will make your children contented and yourself happy, and all will exclaim, "There is no place like home."

"More than building showy mansion,
More than dress or fine array,
More than domes or lofty steeples,
More than station, power and sway,
Make your home both neat and tasteful,
Bright and pleasant, always fair,
Where each heart shall rest contented,
Grateful for each beauty there."

Is there any one thought likely to be called up in after years so pleasing as the reminiscences of a happy childhood's home, when, like the freshness of a sunny May morning, we can call up the panorama of the wrens chirping on the peach trees under our windows, and the call of robin redbreast to his mate in the orchard, where the lambs are playing bopeep around the trees? Then there is the garden with its Spring and early Summer beauties, the breakfast table covered with a snowy cloth, and garnished with clean white ware, and provided with such bread and butter—ornamented, perhaps, with a fragrant bouquet, with the dew still glistening among the leaves, just gathered by a lovely sister, with a thousand other nameless attractions that will float before the mind's eye, to remind it of the pleasures of home.

We look upon a love of home as one of the virtues, that, as a people, the American farmers are entirely too much neglecting. In fact, a dislike of home is much more common than the contrary, and an old homestead is parted from with as little reluctance as an old shoe, and very often for the same reason—because it is down at the heel.

"Seek to make your home most lovely,
Home should be a smiling spot;
Such a home makes man the better
In lofty mansion or a cot."

As one of the easy means of beautifying your house, make it light; "misery dwelleth in darkness."

303. **Reasons why a Dwelling should be Light.**—There is a mania for dark rooms. People do not appear to be aware of the fact, that dark rooms are deleterious to health. Hear what Florence Nightingale says upon this subject:

"A dark house is almost always an unhealthy house, always an ill-aired house, always a dirty house. Want of light stops growth, and promotes scrofula, rickets, etc., among the children. People lose their health in a dark house, and if they get ill, they cannot get well again in it. Three, out of many 'negligences and ignorances' in managing the health of houses generally, I will here mention as specimens. First, that the female in charge of any building does not think it necessary to visit every hole and corner of it every day. How can she expect those who are under her to be more careful to maintain her house in a healthy condition than she who is in charge of it? Second, that it is not considered essential to air, to sun, and to clean rooms while uninhabited; which is simply ignoring the first elementary notion of sanitary things, and laying the ground ready for all kinds of disease. Third, that the window, and one window is considered enough to air a room. Don't imagine that if you are in charge, and don't look to all these things yourself, those under you will be more careful than you are. It appears as if the part of the mistress was to complain of her servants, and to accept their excuse—not to show them how there need be neither complaints nor excuses."

We beg of all who build houses, as well as those who keep them, to become aware of the fact, that there is a generous abundance of sunlight in the country, yet the observer is often convinced that a majority of country houses are but scantily provided with this first requisite of health and comfort.

In reference to admitting light freely into our houses, the words of a writer on the subject are pertinent. He says: "From several years' observations in rooms of various sizes, used as manufacturing rooms, and occupied by females for twelve hours each day, I found that the workers who occupied those rooms which had large windows, with large panes of glass, in the four sides of the room, so that the rays of the run penetrated through the whole room during the whole day, were much more healthy than those who occupied rooms lighted from one side only, or rooms lighted through very small panes of glass." Notwithstanding the cheapness and facility with which glass can be obtained, there is a deficiency of windows even in what is usually considered the better class of American dwellings. Sitting rooms, cheerless enough in having one or two small windows, almost extinguished beneath heavy drapery of paper and cloth, are exceedingly common. For ordinary rooms, white cotton cloth fastened on rollers, as paper is usually hung for window shades, is sufficient for the purpose of screen—admitting at the same time a diffused and softened light.

Dark colors upon the walls, absorbing more or less of the prismatic rays, are also unfavorable in their effects. The writer just quoted found that in rooms of equal ventilation, light and drainage, some of which had white walls, and others yellow or buff-colored, the occupiers were not equally cheerful and healthy. The workers in rooms with colored walls were all inclined to melancholy, and complained of pains in the forehead and eyes, and were often ill and unable to work. By having the color removed and replaced by whitewash, uniform health and cheerfulness were ever after secured. In architecture, a course of progress is distinctly marked from the cave, the wigwam and hut of the savage, who rudely supplies his few wants; from the tent and mosque of the Arab; from the cots beneath the castle and beside the palace; from the negro quarters to the mansion-house; and we wish we could say, progressing upward to comfortable, light, cheerful, elegant homes for every American farmer.

Let them learn that they cannot live rightly in dark dwellings. The mother who, in the fulfillment of her office, preëminently receives and appropriates from all the life sustaining elements, suffers a twofold wrong, in the injury to herself and offspring, by dwelling in darksome apartments; and childhood in such homes is pale and puny—often worse—is squalid and most pitiably diseased. The predominance of the chemical rays in Spring-time is undoubtedly one of the adaptations of this season to the young of animals which then begin their existence, and it also exerts a decided influence upon our own physical health. The invalid desires the return of Spring, for he instinctively feels that nature without will then come to the aid of nature within; and who, after the cold and lifeless Winter, does not love to seek the wind-sheltered nook, there to drink in the warm sunlight, and to receive upon the brow its life-giving blessing? Who has not felt the glorious influence of "bathing in the sunshine?" Then, we conjure you, let the sunshine into your house, and do not be afraid of letting in the air, day or night.

An extraordinary fallacy is the dread of night air. What but night air can we breathe at night? The choice is between pure night air from without and foul night air from within. Most people prefer the latter. An unaccountable choice. What will they say, if it is proved to be true, that fully one-half of all the disease we suffer from, is occasioned by people sleeping with their windows shut? An open window, most nights in the year, can never hurt any one. In sickness, air and light are both necessary for recovery. In great cities, night air is often the best and purest air to be had in the twenty-four hours. I could better understand shutting the windows in towns, during the day, than during the night, for the sake of the sick. The absence of smoke, the quiet, all tend to make night the best time for airing the patient. One of our highest medical authorities on consumption and climate, has declared that the air in London is never so good as after ten o'clock at night. Always air your room, then, from the outside air, if possible. Windows are made to open, doors are made to shut—a truth which seems extremely difficult of application.

304. **The Location of a Farm-house.**—Adaptability is the word that farmers should study, above all others, when about to build a house. It is the

word that they study least, if we may judge from what may be seen in a majority of the farm-houses where we have travelled—that is, from Quebec to New Orleans, and from Florida to Mackinaw. Everywhere is seen the lack of adaptability to the purpose, either in size, form or location. Not one farm house in ten is located upon the farm as well as it could have been. In all the eastern, western and northern States, the farmery is found, nine times out of ten, upon some public road, without reference to the convenience of farming operations; and frequently, in all respects, is very inconvenient.

The location of the farm-house, and the arrangement of all the buildings connected with the farmery, require the exercise of good judgment, fine taste, carefully exercised skill, all combined, more than any other single operation of a whole lifetime, because it is not only for the lifetime of the builder, but succeeding generations.

In the first place, the top of the hill, or highest point of a hilly farm, never should be selected for the dwelling of the farmer; such a site is only fit for the residence of the lord of the manor, who intends to carry on farming by a tenant, or hired farmer, who will occupy the house of the farmery proper. His residence is not the farm-house; it is the mansion of the proprietor, and may be built to suit the owner's taste, if he has any. Our remarks are intended to apply to farm-houses—the dwellings of that numerous class in America who own the soil they till, partly with their own hands, and partly with those of hirelings.

305. **Size and Form of a Farm-house.**—It is not size that makes a dwelling-house attractive, beautiful, or convenient. It is adaptability to the purpose for which it was designed. Indeed, a house often has an unpleasant appearance on account of its size, because it gives the mind an impression that it is unnecessarily large for the purpose for which it is designed.

It is necessary that some farm-houses should be large—that is, afford a great deal of room; but they never should appear large, for if they do they almost inevitably appear uncouth.

Make just as much of the room as possible, on the same level. A farm-house with twelve rooms, should have eight of them on the lower floor. Never have a basement kitchen.

No woman, during the years of child-bearing, who does much of her own work, or oversees it when done by servants, should be compelled to go up and down stairs every hour of the day. Her sitting, or family-room, bed-room, dining-room, kitchen, wash-room, wood-room, well and cistern, should all be on the same level, or with a variation of not more than two or three steps. You cannot be a good man if you compel your wife to run up and down stairs to do her every-day housework. You are not a good man, nor a man of taste and good judgment, if you build your house unnecessarily large, because it will cause your wife many weary, extra steps to keep it tidy and always swept and garnished as you should be proud to have it appear to strangers. You are unworthy the name of man if you keep your wife toiling in a house entirely too small for the necessities of your family, or in one wretchedly ill-adapted to their wants, one single year after you are able to provide a better one.

306. **What constitutes a convenient Farm-house.**—We can only speak in general terms of the plans of farm-houses, because every plan is modified by location and the wants of the proprietor; but we can give an opinion that will be some guide to the new beginner in farm life, or one about to construct a farm-house.

We will suppose a farm of one or two hundred acres, and a family of four adults and four children, besides the necessary hirelings, which in most of the Northern States, are domiciled in the family dwelling. It should, therefore, have a family-room located in the most pleasant part of the house, where the evenings, and all other leisure hours, are, or should be, spent; where the young mother devotes many days and nights of toil to her children; where all the family feel "at home," more than in any other room.

Adjoining this room there should be a large family bed-room, with conveniences for warming it, so that it can be used as a sick-room when necessary. There should also be a parlor, or spare-room; for it is not always desirable to introduce company into the family-room. There should be a dining-room, large enough not only to accommodate the family, but, if necessary, a dozen guests. This room should be so arranged that upon occasion, particularly in Winter, it can be used for a part of the cooking. This would often save the necessity of kindling a fire in the kitchen in a cold Winter morning, to get an early breakfast. The farm-house kitchen, where so much of woman's work must be done, should be a large, cheerful, light apartment, with all the conveniences that modern ingenuity has made to facilitate labor. It should also, above all other considerations, be so ventilated that there would be no necessity for opening a door or window to let out the smoke of a broiling steak, or that of the buckwheat cake griddle. The best cooking apparatus is a good range, permanently set in the chimney. One of suitable size for such a family as we have indicated, will cost about thirty dollars without cooking utensils. The two ovens of a range obviate the necessity of a brick oven in the kitchen chimney. It will be convenient to have such an oven in the wash-room, which should be attached to every farm-house kitchen. This should have an open fire-place, a kettle set in an arch, a brick floor, a large sink, and a pump which draws soft water from the well or cistern. Divided off from this wash-room, there should be a large store-room, for such coarse things as barrels of flour, fruit, fresh meat, and articles of kitchen furniture not in every-day use. Beyond the wash-room, there should be a room for fuel; and the best of all, when it can be had at a moderate cost, is anthracite coal. Opening out of the kitchen there should be a pantry, large enough, and with conveniences to store all the groceries and food in every-day use. In this, or some other convenient place, be sure to have a refrigerator; and adjoining the kitchen, there should be a milk and butter room, where nothing else is ever kept. If cheese is made, it must have a separate room. Butter and cheese must not be stored together. The way to the cellar should open out of the kitchen. We do not advocate large cellars under the house, because they are apt to become the storehouses of a vast amount of stuff tha would be more fittingly stored in some out-building, or an out-cellar. Cellars are generally kept in a way that seriously endangers the health of the family. If the house is set as it should be, well up from the ground, and ventilated under the floor, it is better calculated to promote health than a cellar. If the nature of the soil is very dry, the space under the wash-room may be used for a store-room, or even milk-room, properly ventilated. Every kitchen should have one or more closets, upon the shelves of which the many little things can be kept, each in its place, and all in order. In the dining-room there should be two closets: one for dishes in every-day use, and one in which anything not always, but occasionally, wanted upon the table, and anything desirable to be locked up, can be safely stored.

There should be a large closet for the use of the sitting-room; and there must be such a one in the family bed-room. In fact, this should be a double room, a smaller one attached to the larger for the small children; and this should have its closet, or clothes-press, that children might be early taught to put every article of clothing in its proper place.

The larger children, and other adults, should have large, airy bed-rooms up stairs; and no farm-house will be complete without two, at least, "spare bed-rooms."

307. **How to Build a Convenient House.**—A pleasant-looking, unostentatious farm-house, to contain the rooms indicated, may be of the following dimensions. A two-story portion, 34 by 24 feet, would give half of the parlor 16 by 16 feet, and a spare bed-room 10 by 10 feet, and a hall 6 by 16 feet; a stairway 3½ by 10 feet; a space for pantry, or closets, 2½ by 10 feet; a family, or sitting-room, 13 by 18 feet, and two bed-rooms, 10 by 11 and 8 by 11 feet. This building may be roofed to pitch either way. The other half of the parlor, not comprised in this space, is to be gained by an attachment, 8 by 16 feet, one story high, attached to that side to balance the piazza, giving the house more of a cottage look, as well as being less expensive, and making better rooms on the second floor.

Attached to the main building, a wing or L part, a story and a half high, will give a dining-room 12 by 18 feet, a kitchen 16 by 18 feet, a wash-room 12 by 12 feet, a store-room 6 by 12 feet, a pantry 6 by 8 feet, a milk-room 6 by 6 feet, and passage and stairway to the half story, which will make good lodging-rooms for hirelings.

The fuel-room may be a separate building, and although used for such a purpose, may be made with a finish to correspond with the house, and set forward flush with the piazza, which is to extend along the front of this wing, and will form a good termination to the walk, besides being convenient and approachable from all parts of the house under cover. This piazza, which is 6 by 46 feet, and one 8 by 16 feet adjoining, should, if possible, have a south-eastern exposure, which will make it pleasant to all the rooms most used.

We do not give this as a superlatively excellent plan of a farm-house but one that would be convenient, comfortable, inexpensive, and capable of being erected in two or three parts, if necessary, at different periods, and upon the cheap plan described in No. 350.

The advantage that we claim for this over some other plans is, that if built in parts, at different periods, according to the circumstances of the proprietor, each portion may be made to appear, and serve the purpose of, a complete house. Thus, the part 24 by 34 feet, with the little wings, one forming half the parlor, and the other the piazza, will be a neat looking house, and a comfortable one for a small family; using the sitting-room as a kitchen, and one bed-room as a pantry. Then the dining-room, kitchen, wash-room, etc., might be added, one at a time, as ability or necessity prompts. Or, the part containing the kitchen, could be built first, and would make a tolerable house by itself.

Another advantage of the plan is, that the rooms are all light and airy; every room, except one small bedroom, has windows upon two or more sides, and the whole house will appear to every passer-by, as though built for use, rather than show. It is a great convenience to have a house so constructed that strangers can find some other than the front door entrance.

The space in front of the piazza should be a plat of shrubbery, which would form a partial screen, and in front of that the flower garden. There may be a door out of the dining-room into a garden upon that side.

In arranging the plan of this house, the object has been to place the least used rooms in the house, the parlor and spare bed-rooms, upon the right and left-hand side of the hall, as you enter the front door from the portico. At the other end of the hall is the family room, and large and small bed-room. The stairway is situated, not for show in the hall, but convenient to all parts of the house, running up at a right angle from the hall, between the sitting-room and spare bed-room. The sitting-room is situated in the centre of the house, convenient to all the rooms, warm in winter, airy in summer, and easy of approach. If the ground suits, you may drop the L floor two feet below the main part, and set projecting beyond that part six feet, it allows a window there, and breaks the force of the wind upon that end of the sitting-room, and also gives room at the other end for a window and glass door out upon the large piazza. The common entrance to the house will be upon that piazza, and from that into the sitting-room, dining-room, or kitchen.

There was a plan, published by G. C. House, of Lowville, N. Y., in the *Country Gentleman*, so novel in its form, and apparently so convenient, that we consider it worthy a notice in this connection. The following is what he says of his plan.

"In the plan submitted, we flatter ourselves that some improvements have been reached, when we take into consideration convenience, space, accessibility, the ease with which the hot air passages from the furnace can be arranged for so many rooms, all within a few feet of the body of the furnace; and each door within a few steps of the main stair-case. From the peculiar form the centre of the house is at once reached on entering the front door. The second story is quite similar to the first, closets occupying the spaces over the library and pantry, and a fine balcony over the veranda, reached through glass doors.

"To meet the full requirements which were had in view, in this arrangement, a site should be selected having a southern or eastern exposure if in the country, and the building set with both full fronts to the street, so that the veranda or front door will have a direct front aspect. If, however, the location be in city or village, it would be desirable to procure a lot having two fronts, if possible looking easterly and southerly, and place the building with a front to each road, the front door looking toward the angle of the street."

308. **Ventilation of Dwellings.**—In whatever form, or upon whatever plan you build, do not forget the necessity of ventilation. Our dwellings are often charnel houses. The very first necessity of every human being—pure air—is rarely regarded in their construction. The air actually inhaled steals in at crevices and crannies, felon-like, because it cannot be shut out. Only the defects of our architecture prevent our dying of a vitiated, poisoned, mephitic atmosphere, from which the vital element has been exhausted. Most men, including architects, seem ignorant of the fact that the atmosphere is a combination of different gases, only one of which is wholesome and life-giving, and that this is consumed in the lungs upon inhalation, leaving the residue to be expelled as a poison. The church, lecture-room or other structure, with doors and windows closed, with no provision for ventilation, soon becomes a slaughter-pen, and ought to be closed by the public authorities.

Our manufactories and school-houses are nearly all disgraceful to their owners and architects in regard to ventilation. They are often divided into rooms less than ten feet high, each thickly stowed with human beings, who breathe and work and sweat in an atmosphere overheated and filled with grease, wool or cotton waste, leather or cloth, and the poisonous refuse expelled from human lungs, which together are enough to incite a plague, and are, in fact, the primary cause of nearly all the fevers, dysenteries, consumptions, etc., by which so many graves are peopled. No factory should be permitted to commence operations, nor school opened, until it shall have been inspected by some competent public officer, and certified to be thoroughly provided with ventilators—not windows, which *may* be opened, but in a cold or stormy day very certainly will not be—but apertures for the ingress of fresh air, and others for the egress of vitiated air, both out of the reach of ignorance and defying the efforts of confirmed depravity of the senses to close them.

Our bed-rooms are generally fit only to die in. The best are those of a few of the intelligent and affluent, which are carefully ventilated; next to these come those of the cabins and rudest farm-houses, with an inch or two of vacancy between the chimney and the roof, and with cracks on every side, through which the stars may be seen. The ceiled and plastered bed-rooms, where too many of the middle class are lodged, with no apertures for the ingress or egress of air but the door and windows, are horrible. Nine-tenths of their occupants rarely open a window unless compelled by excessive heat, and very few are careful even to leave the door ajar. To sleep in a tight six-by-ten bed-room, with no aperture admitting air, is to court the ravages of pestilence and speedy death.

Our railroad cars and steamboat berths are atrociously devoid of ventilation. A journey is taken with far less fatigue, and more expeditiously now than it was thirty years ago, but with far greater risk and harm to health. There are probably ten thousand passenger cars now running in the United States, whereof not more than one hundred are decently supplied with fresh air. Most of these, wherein forty or fifty persons are expected to sit all day and dose all night, ought to be indicted as nuisances—they are fit only for coffins. The men who make them probably know no better; but those who buy and run them have not even that poor excuse. They know that they are undermining constitutions and destroying lives; they know that ample means of arresting these frightful woes are at command; yet they will not adopt them because they cost something.

If people only knew how many thousands of lives are annually sacrificing, how many hundreds of thousands are now suffering from fevers and other maladies which have their origin in the inhaling of noxious air, the excitement and alarm on this subject would work a revolution in our style of building.

When we lived in old-style houses, with large open fire-places, like the one mentioned in the next paragraph, there was no need of being careful to build air-passages in the walls of the house for ventilation, for the "fire-place, big enough to roast an ox," gave the most complete kind of ventilation.

It is of the utmost importance, particularly in malarious districts, that houses should be so constructed that a free circulation of air can be had through all the rooms. In the plan described in 305 this fact has been kept in view. With slight modifications, the plan will answer for a house either at the north or the south. At the south the rooms would be made larger, and the fuel-room would probably be substituted for the kitchen. Frequently, the kitchen of a planter's house is placed several rods distant, without any covered way between.

309. **An Old-Style Farm-house Kitchen in New England.**—A picture of one of these scenes of comfort has lately fallen under my observation. What can be more cheerful and pleasant than the view of a farmer's kitchen, taken during the evening meal of a cold Autumn day? It is a picture of the calm happiness of rural life.

The kitchen of the old-style farm-house of New England is not the scullery, or mere cooking-place of some modern house—a dirty hole or comfortless out-room or sort of human bake-oven, where the cook is almost as much cooked as the food. No, it is a room perhaps 24 feet long and 16 wide, well lighted, warm, neat, and every-way comfortable. Upon one side there is a fire-place large enough to roast a whole ox, in which a great fire of logs sends up a cheerful blaze, lighting up the whole room so its brightness might be seen through its great uncurtained windows, like a beacon light to the traveller as he comes down the slope of yonder hill two miles away, and makes him involuntarily thank God, in anticipation, for the good things spread out upon the great table standing between the window and the fire.

Let us take note of the old-fashioned meal. At the head of the table sits a matron of some sixty summers—though in appearance there is nothing of the winter of old age about her. Her dress is a gown of home-spun worsted, well fortified with flannels from the same manufactory, that bid defiance to the Autumn winds of a rigorous climate. The small, neat cap of white gauze, and the shoes and stockings of this woman, were made in pursuance of the best medical recipe ever written: "Keep the head cool, and the feet dry and warm;" for the stockings are the product of busy fingers at moments idle with many housewives, and the shoes of stout leather were made for service, and the cap is a mere ornament—a snow-wreath among raven locks—and her face is the indication of health and happiness.

Upon her right hand sits the farmer, dressed in a butternut-colored coat, blue pants, buff vest, white linen shirt—every article home made—stout boots and black silk cravat—for he has been to town, and this is his holiday suit. Below him sit Jedediah, Ebenezer, Abram, and Solomon, all economical names, for they can be shortened in common use to Jed, Eb, Ab, and Sol. Two of these wear the check woollen winter frocks of New England farmers—the others are in round jackets; they are schoolboys. Upon the left sit Mary, Adeline, and Mehitable, pictures of real beauty and health. The eldest is "dressed up;" she has been to town with her father; she has a gown of "boughten stuff;" around her neck is a bow of colored lamb's wool, knitted by her own hands, fastened in the throat by grandmother's silver brooch. The other two are in check woolen, which was spun, woven, and colored, and made up under the same roof.

Further down the table are three athletic young men, day laborers on the farm—sons of neighboring farmers—one of whom is eyeing the charms of sweet Mary with an expression easily read by a good physiognomist. The group is completed by the schoolmaster, a young man with a glowing eye which speaks of intellect that will tell upon the world some day with as much force as though he had not been obliged to obtain his education by summer labor and winter teaching. He is one of New England's rising sons.

The meal is for men who toil. At one end of the table stands a pot, of ample dimensions, smoking from the oven flanking the fire-place, of the most excellent of New England cookeries, "a dish of baked beans," crowned with a great square piece of salt fat pork, crisped and rich. Lower down a broad pewter platter holds the remains of the "boiled victuals" that formed the dinner—beef, pork, potatoes, cabbage, beets and turnips—a pile that might rival a small hay-cock in size and shape—a plate of rye and indian bread, cold, and another made of rye flour are untouched, for a great loaf, just drawn from the oven, nicely browned and hot, is offered in great broken pieces to tempt the appetite to one of the richest repasts ever given to an epicure. By the side of the old lady stands a black earthern teapot, the contents of which are freely offered, but only accepted by two of the men, as the rich new milk, or the hearty old cider is preferred as a beverage, morning, noon and night, by those old-fashioned, hearty laborers. We must not forget the never-failing accompaniment of the evening meal at this season of the year in New England, for it is New England's proudest dish, the golden pumpkin, sweetest pie.

God being thanked for his great bounties after the close of the happy meal, all are drawn into a circle around the great fire-place. Father is finishing off an axehelve; Jed is mending a pair of boots; and one of the hired men, upon the other side of the same bench, is repairing a wagon harness—both using the same tools. The other two are employed, one shelling corn and the other helping Mary to peel pumpkins, which are cut in slices and hung upon poles overhead. This is Mary's accepted lover. Happy hearts and blessed industry! Ab and Sol are engaged with the schoolmaster around the big table, lighted by a home-made candle; they are studying geography, writing, spelling, and arithmetic—fitting themselves for future statesmen. Mother is making a new coat for one of the boys, Ada is ironing at a side-table, and Hetty is washing the supper dishes at another. There are two other members of this family group—the cat occupies the top of the blue dye-tub which stands in one corner of the fire-place, and old Bose sleeps quietly under the table.

Directly, and before any sound is audible to human ear, Bose gets up, walks out into the long entry, and gives a loud, sharp bark at the outside door, and stands waiting the approaching step. Soon satisfied that the new comer is a friend, he retires again to his repose, and three or four boys, who look as though they might be brothers to those already described, so much are they dressed alike, enter and draw around the table with the others and the schoolmaster. These are from a neighboring farm, sons of a widow, who have till now been so much engaged with the labors of the farm that they have been unable to attend the school in the daytime, but are determined to lose none of the evening opportunities to keep along with the class. They will make honest, intelligent, industrious farmers.

The old folks welcome them heartily, and the young ones are all rejoiced at their arrival. The old lady inquires why in the world their mother did not come along; and Mary, the kind-hearted Mary, is so sorry to hear that it is because Sarah is not so well, and mother is very busy getting their new clothes done so that they can go to school as soon as they finish picking apples. "John," says she, "let us hurry and get through our stent and we will go over to the widow's; and I will help her with her sewing; you will read for the amusement of poor Sarah, for an hour or two." "If that is the case," says father, laying down his axe handle, "my good children, you shall go now; I will finish your work." "And Mary, my dear girl, don't go empty handed," says mother; "you know from experience how sweet little delicacies, brought by friendly hands to the side of a sick-bed, are to a poor invalid."

"Hetty, my dear, if you have done your dishes, you must get your cards and make a few rolls, for I am quite out of grey yarn, and we must have some more stockings in the work. Old man, don't cut that pumpkin too thick.—Ada, daughter, get a plate of doughnuts and some of those nice fall pippins and set on the table; I guess these boys can eat a few while they are cyphering. I do wonder if you have got light enough. Sol, get another candle, I am sure such industrious boys ought to have all the light they want."

Thus, my readers, I have given you a slight outline of a farmer's house, such as it used to be, such as it might be, and such as it always should be, and such as, I am proud to say, many an American farmer can boast of even in these degenerate days of "boughten stuff gowns" and lack-a-daisical lounging of farmer's girls, who are miserable and tired of nothing to do. How do you like the picture? If well, imitate it. It is a happiness easily acquired.

It is easy to imagine the surroundings of such a home as the one described above. And as there is probably no better exponent of the farmer's life than the farmer's home, we propose to present the portrait of a home quite in contrast to the preceding one. We are sorry that such as this are altogether too common. Here is the sketch:

A square brown house; a chimney coming out of the middle of a roof; not a tree nearer than the orchard, and not a flower at the door. At one end projects a kitchen; from the kitchen projects a wood-shed and wagon-cover, occupied at night by hens; beyond the wood-shed a hog-pen, fragrant and musical. Proceeding no further in this direction, we look directly across the road, to where the barn stands, like the hull of a great black ship of the line, with its portholes spread threateningly upon the fort opposite, out of one of which a horse has thrust his head for the purpose of examining the strength of the works. An old ox-sled is turned up against the wall close by, where it will have the privilege of rotting. This whole establishment was contrived with a single eye to utility. The barn was built in such a manner that its deposits might be convenient to the road which divides the farm, while the sty was made an attachment of the house for convenience in feeding its occupants.

We enter the house at the back door, and find the family at dinner in the kitchen. A kettle of soap-grease is stewing upon the stove, and the fumes of this, mingled with those that were generated by boiling the cabbage which we see upon the table, and by perspiring men in shirt-sleeves, and by boots that have forgotten, or do not care where they have been, make the air anything but agreeable to those who are not accustomed to it. This is the place where the family live. They cook everything here for themselves and their hogs. They eat every meal here. They sit here every evening, and here they receive their friends. The women in this kitchen toil incessantly, from the time they rise in the morning, until they go to bed at night. Here man and woman, sons and daughters, live in the belief that work is the great thing, that efficiency in work is the crowning excellence of manhood and womanhood, and willingly go so far into essential self-debasement sometimes as to contemn beauty, and those who love it, and to glory above all things in brute strength, and brute endurance.

We do not expect to see every farm-house a domestic paradise; but we do contend that one contrived upon the moderate plan described in No. 305 will be likely to produce a better race of men and women than such a home as the one last mentioned in this paragraph.

Having occupied as much space as we can afford to give to the dwellings, let us now look at some of the surroundings necessary to make up a complete farmery.

SECTION XV.—CELLARS, CHIMNEYS, AND ICE-HOUSES.

IN a cold climate, two of the most important requisites of a farm-house are good cellars and good chimneys. In all the great farming region north of Lat. 40°, there are nights almost every Winter in which the thermometer falls 10° below 0° of Farenheit; and in some of the elevated portions of New England it sometimes falls 40° below zero. There warm cellars are a necessity. Everywhere chimneys are so, for there is not a greater source of vexation about a farm-house than a smoky chimney. Formerly, ice was looked upon as a luxury merely; it is so no longer. Hence we devote space to give the best information we can obtain, how to build an ice-house and preserve its contents.

310. **Cellars—Where and How to Build them.**—As we have already intimated, we do not approve of extensive cellars under dwellings. As a general thing, in all damp soils, like millions of acres of the western prairie lands, cellars, even when kept with the utmost care, are not healthy; and when kept as we have often seen them, dripping with moisture, and frequently with water standing several inches deep, they are positive contagion breeders. In all such situations we recommend cave cellars, built on the level of the surface. An excellent one which we built near the kitchen door, 8 by 20 feet, was made of eight-inch brick walls, seven feet high, with an entry and double doors at one end, and double windows at the other. At first our design was to arch this over and make a grassy mound; but upon

second thought, we earthed it up as high as the top of the wall and then put on a building for a smoke-house, the fire for which was built at the bottom and carried up in a flue. Where there is a hillside, a cave cellar may be made more easily, though we did not find it a serious job to heap up the earth from the level ground, taking care to slope it off so as not to leave any noticeable depression. Such a cellar is very convenient, dry, pleasant, and not unhealthy. If built where a building over it would be unsightly, or not needed, it may be arched and covered with earth and made quite an ornament of the house surroundings.

Wherever a cellar is it should have as uniform a temperature as possible, the year through; it should never sink much below 38° Fahrenheit, nor rise above 50°, and it should be always moist, yet never wet. It should be also well ventilated, and that should be by a flue of the chimney, constructed specially for that object, when the cellar is under the dwelling.

311.—**Chimneys—How to Build them.**—A new combination of chimney and ventilator has been patented by a Philadelphian (Mr. Leeds), and is very strongly recommended by many who have tried it in that city. The brick wall of this chimney is without flues, no matter how large the house, but the smoke is carried up, say half the height of the building, through a cast-metal box or square flue in the centre of the stack, while pure, cold air is introduced at the bottom of the building into the chimney outside of the flue. The heat of the flue causes this air to ascend with great rapidity and force, carrying the smoke with it from their juncture at the top of the box, and rendering it wholly impossible that the chimney should ever smoke. Ventilation is effected by valves opening from the external or air-chimney into the rooms, so as to throw out a column of air, warmed by its contact with the flue, into the room near its floor, while another valve near the ceiling sucks in and carries off the impure air—the draught of the heated flue being aided by the influx of heated air through the lower valve into the room. This arrangement, it is claimed, saves the expense of brick flues, saves heat, which otherwise passes off uselessly through the chimney, insures a thorough ventilation without trouble or cost, and affords a perfect security against fires from defective or overheated chimneys, through the gradual charring of the wooden beams or other timbers imbedded or ending against the chimney. A connection with the cellar, by an opening into such a flue, would draw off all the foul air that would be generated in any but a very badly kept cellar; besides proving a valuable safeguard against the carelessness of carpenters, who do sometimes place wood in fearfully dangerous places. If all stove-heated houses had such means of ventilation, it would do something toward bringing back the same state of health that existed in connection with open fire-places.

The comfort of a dwelling depends in a great degree upon its having good chimneys, always maintaining a current of air upward within, and secured externally against the entrance of water. Form, size, location and workmanship, all unite in producing a good or bad article.

The ridge or highest part of the roof is the best place for the exit of the chimney, for it is less liable to those sudden gusts of "blowing down chimney" than when in proximity to higher objects. In this place too, the roof is more easily rendered tight and secure against wet. In small houses with but one chimney we need not seek any other place for it. In buildings larger, where several chimneys are needed, keep the same object in view, and approach as near to it as possible. In brick houses, if the chimney is built into an exterior wall, it will sometimes fail to draw well, because the air outside of the house cools the warm ascending current within the flue. If the flue is in a south wall, the heat of the sun sometimes aids the draught.

The size of the chimney is also important. The modern fashion is quite too small for utility. Economy of space and a desire to conceal entirely an object merely of utility, have caused its dimensions to be contracted until a few months' deposit of soot entirely chokes the passage. While we no longer need the huge "good old-fashioned chimneys" of former days, the flues should not be contracted so as to hinder the current of smoke, which needs a channel as smooth as for the flow of water. We often find the curves, where the most room is needed, half filled with mortar carelessly dropped and loosely adhering to the bricks. By making a proper table above the roof, it can be made water-proof; but this, if not well done at first, always proves a vexatious and difficult matter to accomplish. Mortar, putty, cement, and paint, in all their variations, have been tried with various success. An old grafter recommends for this purpose "grafting wax," as the cheapest, surest, and most durable application. But we say, build so that they will all be unnecessary.

Always begin your chimneys from a good foundation on the earth. He who builds a small "stem" in the garret, builds a large nuisance for himself. The soot tea, black and penetrating, will leak out to discolor the walls, the gathered soot and ashes cannot be removed, and the thing proves a chimney only in name and in its appearance on the roof.

All unused stove-pipe holes and fire-places should be closed to secure the best draught.

Where there are two chimneys in the same building one will sometimes overpower the other, with the most provoking results. This is a contingency to be regarded in forming the plan.

The top of the chimney may be full size and open where there is no danger of down currents; otherwise it should be arched or provided with some cap or ventilator of sheet iron. Those who have built will see the importance of these hints; those who are to build, will do well to regard them.

312. **Ice-Houses.**—Next to a good cellar, an ice-house is a necessity of a farm-house. Here we can do without an ice-house, and north of latitude 40° we cannot do without a cellar—at least, not comfortably; and, in our opinion, any family who have once enjoyed the comforts of an ice-house,

will ever after think that they cannot live quite comfortably without one.

We have often witnessed in good farm-houses the necessity of a supply of ice, in the character of the butter placed upon the table—even among those who know *how* to make good butter, we find a quality far inferior to the samples made where there are cool spring houses or an abundant supply of ice. We give a few other reasons in favor of every farmer's having an ice-house, and we beg farmers to read and consider them well, and then we will tell them how to build one.

313. **Reasons why Farmers should have Ice-Houses.**—It is August; hot, faint and exhausted, the farmer comes from the field so thirsty that he cannot satisfy himself with water from a well so shallow that the burning rays of the sun have reached the surface and penetrated into the water, warming it almost hot enough for dish-water. Some draw their water from springs, and others from cisterns. It is only here and there that we find a spring that comes gushing to the surface, or that feeds a deep well with water, cool enough to satisfy the over-heated, thirsty harvester. How refreshing such water is, not only to drink, but to lave the face and hands and breast, before sitting down to a meal, or lying down to repose to recuperate tired nature. We have no doubt that the laving is far better than the drinking, and it should always be the first step taken to quench thirst.

Again, how refreshing is a cool drink with the lunch in the field, but how difficult to have it there, at only half a mile from the coldest spring or well. How easy it would be if there was an ice-house on the farm. A piece that could be carried in one hand, wrapped in a blanket, would be large enough to cool the drink of a dozen men all the forenoon, and it would invigorate them more than a bottle of rum. Ice, taken in moderate quantity, is a tonic, and serves to keep the system in such healthy condition, that food gives it more strength. Simply, then, upon economic principles, every farmer should have an ice-house. A humane man should have an ice-house. It adds to the health and comfort of his summer laborers. Let him think of it now—think of it in August, think of it while sighing, Oh, for a cool drink! Oh, for a cup of ice-water!

The stingy man, the veriest old hunks, who is never quite satisfied with the amount of labor that he gets out of his workmen in the harvest-field, should have an ice-house; it will enable him to get more work out of them. Now is the very time to think of this; particularly in the heat of the harvest-field.

The man that knows that fresh meat is not only more palatable in the heat of Summer, but that there is a positive economy in feeding his family and extra laborers upon sweet grass-fed beef and mutton, and upon cold milk and sweet, hard butter; and that a man who does feed his day-laborers so can always get better men and more work for his money than his neighbor who lives upon salt junk and rum, will have an ice-house; and if he has not got one he will make up his mind, before the present Summer is over, that as soon as there is a lull in the work of haying and harvest he will set about building an ice-house, which he can do with his own hands and common farm-laborers; and with less than the work of one hand and team during a week in winter, he can lay up such a store of ice that he need never drink warm water, nor eat soft butter, nor fear to kill a sheep lest the meat should spoil before it could be eaten.

Let all remember this fact: Ice is not a luxury; that is, one that can be dispensed with, and may be indulged in only by the wealthy; but one of the most economical things that can be provided for family use. It is an article that no farmer can afford to do without.

Now, having given arguments enough to convince any man that he should build an ice-house, we proceed to tell him how to do it.

314. **How to Build an Ice-House.**—An ice-house is not the complicated, costly structure that some people appear to think it is. Quite the contrary, it is one of the easiest and most simple things to build, needing very little mechanical skill, and being quite inexpensive. All of the work about an ice-house can be done by any farmer of ordinary Yankee capacity in the use of such a set of carpenters' tools as every farmer should keep. In the first place, it is not necessary to build an ice-house under ground, although in dry, gravelly soil it may be built so at less expense than on the surface, and it is easier filled. A hill-side is the most convenient location, with the gable of one end above the surface, in which have an opening to put in ice—the other end, to a level with the floor, being exposed—through which we would have the ordinary entrance by double doors. In such a situation we would use broken stone, making a hollow, grouted wall; and the same kind of wall might be built on level ground; and a very good, cheap, durable wall it is. Brick or stone may also be used for the walls, according to the fancy of the builder, always making them hollow, and the outer and inner part of the wall absolutely as air-tight as could be made with brick and mortar.

The cheapest, easiest and quickest constructed ice-house, and one all-sufficient for the purpose, is built of wood; and the money difference in cost placed at interest will more than keep the wooden house in repair and good as brick or stone. So we will give directions for building a plain, cheap, common, rough-board, farm ice-house, large enough for all ordinary private families.

Select a spot of ground convenient to the kitchen door, and remove the soil and put coarse gravel or sand in its place, with drains leading away from the eaves, so constructed that it will be absolutely impossible for water to stand under or around the building. Lay down two-inch plank six inches wide, bedded their thickness in the sand, for sills; the end ones eight feet long and side ones thirteen feet. Cut your studs off square, eight feet long, of any size or width that you can get in the refuse heap at the nearest saw-mill or lumber-yard, so that you can get one straight side, and set them up face side in, and toe-nail them to the sill, with an inch-board on top for a plate, upon which rest the joist; nail up through the plate to hold them in place. Now board these studs on the inside, and batten the cracks with rough boards, and serve the under side of the joists in the same way. This makes a tight boarded room, eight feet wide, eight feet high, and twelve feet long. The floor must be laid upon timber bedded in gravel or charcoal, to cut off any currents of air, but so that all water from melted ice will drain off immediately. Divide off four feet of the end in which you intend to have the door, for a cooling-room, and you will have room for a cube of ice eight feet, less the straw or sawdust all around between the ice and boards, and this will last any family through the hot weather, with most liberal use of it for all needed purposes.

Now for the protection of the ice to prevent its melting. Set up another "balloon frame" outside of the first, from one to two feet off, the widest space being the best, boarded perpendicularly with rough boards battened. The top of the outer frame must be tied firmly to the inner one by strips of boards nailed from plate to plate, and the space between the walls compactly filled with charcoal, sawdust, or straw, provision being made for a narrow doorway in one end, to be closed with shutters inside and out, which must be made to shut tight, and will be greatly improved by lining them with a coat of straw two inches thick, fastened on by lath nailed across. About the roof. This must be made in the same way as the sides, with two sets of rafters, boarded and filled between with straw, with good shingling outside, or some other tight roofing. It will be necessary to make a trap in the roof, or a door in the gable end, opposite the usual entrance, with a slide leading to the interior, for the convenience of filling, and there must be a suitable ventilating chimney, six inches square, from the ice up through the roof, which at times may be partially closed by a wisp of straw. The space between the joists and the rafters, if filled with straw, will assist in the preservation of the ice, and need never be removed, except the portion around the door made for putting in ice.

The expense of such an ice-house it will be easy to calculate upon the local cost of lumber.

Such a building as we have described will take forty-eight studs 8 feet long, 2 by 4 inches in size, which is quite strong enough, and sixteen inside rafters of same size, 8 feet long; twenty rafters of same size, 9 feet long, for outside; two sills 2 by 6 inches, 8 feet long each; two ditto 13 feet long each for inside frame; two ditto 16 feet and two ditto 12 feet for outside sills, and some short pieces of stuff for gable-end studs; for plates two boards 6 inches wide, 13 feet long; two ditto 8 feet long; two ditto 12 feet and two ditto 16 feet each; and this constitutes the timber of the frame, and will not exceed 700 feet, board measure. In fact, this whole frame could be made of straight poles, or split stuff, which would cost but a trifle on some farms. The boarding of sides, roofs, floors, partition, measures in all, we believe, 1,620 feet of surface and battens, so that 2,500 feet of lumber and 2,000 shingles appear to be ample for an ice-house to stow a cube 8 feet square, with a cooling-room 4 by 8; and two men can build it in four days. Now count the lumber at $12 a thousand, shingles at $4 a thousand, work at $2 a day, nails, hinges, etc., $2, team work $2, and we have a total of $50 for the cost of a building that is worth $50 to any farmer every year. Who would do without an ice-house?

Having given the above as our own plan, we will add the plans of several others. One writer says:

"Instead of one hollow wall for a non-conductor of heat, as in ordinary ice-houses, I have two, with a space between them for confined air. The site is on a gravel slope. The foundation, for convenience in storing ice, is dug two feet below the surface of the ground. The outside wall, for non-conducting material, is six inches in the clear. The inside wall is four inches. The doors for entrance correspond perfectly with the hollow walls in thickness, and are filled in the same manner—being shaped to shut with a bevel edge, like the door to safes used by merchants and bankers. At the lower side of the plates is a ceiling, upon which I put spent tan one foot thick, which tan is in direct connection with the side-walls, so that any settling in of the walls may be supplied from overhead. From the under side of the ceiling runs a ventilator, with a hole of one and a half inch bore, up through the roof, which is finished with an ornamental cap.

"The room for ice is eight by ten feet in the clear, and eight feet high. About all the waste of ice that I observed during the summer was at the bottom, and this was so slow that we used the ice without regard to economy for a large family, and in a dairy of thirty-five cows, besides giving freely to our neighbors.

"I put sticks four inches thick in the bottom to put ice on, and also some straw about the sides as well as underneath the ice."

At a discussion about ice-houses, by the American Institute Farmers' Club, the following facts were elicited:

Mr. PARDEE read an extract from a paper upon the ventilation and drainage of ice-houses. It states that an underground ice-house is calculated to melt ice much faster than above, because the earth gets heated and melts the ice.

WILLIAM S. CARPENTER—It is a question of great moment to farmers how small a cube of ice can be kept well. I have not, in my experience, found that one less than ten feet will keep. I have a floor over my ice, which I keep covered with straw, and find it an excellent thing to prevent thawing. I find the bottom layer of my house, which is an underground one, keeps better than the layers above. Some of my neighbors think the ice keeps the best if the cakes are set on edge.

JOHN G. BERGEN—The great ice-packers I have seen put in their cakes flat, and very compact. Some of my neighbors break up the blocks of ice, but I prefer the solid blocks. My opinion is that straw is better than salt hay to pack ice in. I should prefer to have a very heavy coat of straw on the ice, and then I don't care about the ventilation above. I will say, however, that my neighbors' ice-houses that have no upper floor, and are a good deal open at the top, do keep the ice well.

Prof. NASH—We are too much inclined to be innovators in all our buildings, and in ice-houses particularly. We must look at the true philosophy of keeping ice, or we shall fail; for the philosophy of it is to put it as much away from the air as possible, and that is why we pack it in straw or sawdust, etc. As to giving some ventilation to the loft, or space over the ice, it may be of service. I think that an ice-house should not have any provision for ventilation—the tighter the better.

SOLON ROBINSON—There is a misunderstanding about this term ventilation. As one of the advocates of it for an ice-house, as well as all other houses, I do not mean open exposure, but simply to allow an escape of the heated air that will accumulate in the space between the straw and the roof. Make it as tight all round the body of the ice as possible, by using non-conducting substances from the exterior, and cover the top of the ice as closely as you please with sawdust or straw, but don't make the upper part too close; at least, leave the cracks in the gable ends open. As for the sides, the best of all substances to fill with is fine charcoal; the next best, sawdust; next, tan-bark, straw, leaves from the forest, or salt hay, or any other fibrous substance. It is not necessary to have a double wall if your ice is sufficiently packed around with any of the above substances. The air, at any rate, must not come in contact with the ice, nor with a board that touches it. And a stone or the ground will melt ice much quicker than wood. What I have been most anxious for in bringing up this discussion upon ice-houses, is to divest the subject of all scientific nonsense about making buildings to keep ice of so expensive a character that no common farmer would undertake it. Yet there are thousands of men who might enjoy the comforts of a full supply of ice, and some of them would do it if they only knew that they could build a house at almost no cost. A log cabin, as described by Mr. Pell, or a cellar lined with fence-rails and a board roof, with plenty of sawdust, leaves, or straw, will keep it longer than a stone or brick building, put up at a cost of $500. I want to encourage people to build cheap ice-houses.

A correspondent says: "I live on Staten Island, where neither charcoal, sawdust, nor tan-bark can be had, except at great expense, but dry forest-leaves and salt hay cost but a trifle. Will either of the latter answer a good purpose for an ice-house out of the ground, and, if so, which is the best? (1.) I propose to make two boxes of rough hemlock boards—the outer one twelve feet square by ten feet high, the inner one ten feet square by the same hight—so as to leave a continuous space of twelve inches all round between the boxes, this space to be filled with leaves or hay pressed down tight. (2.) The roof to be covered with tongued and grooved boards, and set at an angle of 35 degrees, with a projection of two feet. The double doors will be in the peak of the roof, the outside frame to be supported by chestnut posts, lined on one side, and set into the ground four feet apart; the inside box, or frame, to be supported by joists, 2x4-inch, set edgewise, three feet apart, secured against the inner side. Chestnut sleepers will be laid on the ground, covered with loose boards, from which there will be good drainage. Will it be necessary to make the roof double, and have an opening on the top for ventilation? (3.) Can you suggest any improvement on this plan, without increasing the cost? (4.) One of my neighbors, for the want of tan-bark or sawdust, built an expensive ice-house on the ground, walled up with stone, but it fails to keep the ice. (5.)"

I will briefly answer these inquiries:

1. Either salt hay or leaves will answer a good purpose, and I should use whichever is the cheapest.

2. This plan will make an ice-house that will keep the contents safe in any place.

3. There is the same necessity for a double roof that there is for double sides, and more, for that is not necessary if there is a good thick lining of straw between the ice and boards. I double my roof by a thatch of straw, first laid and then boarded over.

4. The improvement I should suggest would be a cheaper frame. Make the outside just like the inside. It is cheaper, and will answer just as well as the chestnut-posts.

5. This is probably owing to deficient ventilation; that is, openings in the gable ends far above the ice, to allow the hot air and foul gases that accumulate there to pass off. If the stone walls of an ice-house once get heated from the sun, they retain the heat both day and night, and communicate it to the atmosphere within. Stone is the worst material for an ice-house that can be used.

Robert L. Pell said that he built an ice-house just like a log-cabin, in the ground, with a board roof, that keeps ice first-rate. He built one of stone and one of brick, laid in cement, neither of which would keep ice. He fills on a cold day, and leaves the house open to allow the ice to freeze. He packs broken ice into all the spaces between the cakes, and puts straw at the bottom eight inches thick, and packs the ice up to the wood on the sides, and leaves it until June or July, when there is a space melted away all round, and that is then packed tight with straw. His ice-house is most thoroughly ventilated in the upper portion of it. A full set of ice-tools costs about $50, but he did not think it necessary for a farmer to go to that expense; a saw is nearly as good as an ice-plow to cut ice on a small scale, when great haste is not very necessary, as is the case with the great ice-gatherers for market.

John G. Bergen—My ice-house is a cellar, about twelve feet square at the top and ten feet at the bottom, and this is fitted with a double-boarded frame, the hollow filled with sawdust. The earth is so porous that it gives a natural drainage. There is a building, used for other purposes, over the ice-house, which is ventilated, but the ice part has no ventilation; and I cover the ice with sawdust, and also around the sides, and it keeps well. I pack the cakes close, and they come out as square as they went in. There is a free circulation of air in the upper part of my ice-house, and nothing but straw to exclude the air from the ice. The great Hudson River ice-houses are very large, and always built above ground, with double walls, filled with sawdust. The ice is packed close, and broken ice filled in to all the cracks. Some single ice-houses hold 3,000 tuns; and most of the ice used in the city is cut upon the river, and not upon lakes.

Mr. QUINN—I noticed that some of these ice-houses use salt hay. The roofs and sides are double, and the best of them are filled with fine charcoal, making the walls eighteen inches thick. I know one person who had an underground ice-house, and now has one above, which he prefers; the ice keeps in this the best.

J. P. VREEDER—I made my ice-house by digging a hole ten or twelve feet square, and lined it with boards as a double wall, filled in with tan-bark. My roof is a straw thatch. My ice keeps perfectly well. I have good drainage, and I put about six inches of straw around the ice on bottom, sides, and top. The house is only four feet below the surface, and the rest above. I pack about twelve or fourteen tuns of ice, being careful to fill all the crevices with broken ice.

JOHN G. BERGEN said that he did not think a double roof necessary. None of the ice-houses in his neighborhood had them.

Prof. MAPES—The point settled in building ice-houses is, that the whole ice-house should be above ground. This is the practice in Massachusetts. There is no substance equal to a confined space of air for the walls of ice-houses. Build of whatever substance you please, so that you have a double wall, and tight enough to hold air, and you will have a perfect protector of ice. As to ventilation, Jenner, who first constructed ventilated ice-boxes, found that ice melted faster in ventilated than in unventilated boxes. Ventilation is necessary when you desire to keep food sweet. If there is no ventilation, the confined air soon becomes very foul from animal substances on ice. He then gave some interesting particulars of the large refrigerators in some of the city packing-houses. Some are so large that they use up a number of tuns of ice a day. The temperature is kept at 42 degrees, and in large rooms thus cooled hundreds of animals can be killed and cooled every day. If your object is to keep ice without use, shut up close—it needs no ventilation.

315. **How to Make and Store Ice.**—H. LYMAN, of Johnstown, Wis., tells how to make ice for putting up in ice-houses, where there is no convenient pond or stream, and how to store it without an expensive house built on purpose. Mr. Lyman says:

"I live on the prairie. On the coldest day of January I draw water from the well and pour it into square tin pans, two feet long, nine inches wide at the bottom, and nine and an eighth at the top, and about nine inches deep. While I have been drawing water, Dick has been gathering clean snow and putting it into the water. The compound is frozen immediately. I now apply hot water with cloths to the sides of the tin containers, which enables me to empty out the blocks of ice.

"A cube of ice of four feet is all I need. No separate building need be erected to keep it in. The barn, the wood-house, or the tool-house can furnish an ample corner. The conditions of its safe keeping are—the walls of a building around, and two feet of compact straw on every side of the gelid mass. In packing, I lay loose boards on a bed of straw, and on this platform I lay the ice. I take care to expose the ice to the lowest temperature of the year, and lay it up in the coldest state. If every alternate block of ice is inverted, the mass is thereby made compact; if not, there will be a little space open at the bottom between the respective blocks. When the cube is complete, cover the whole with straw. This work can be effected with milk pans or other vessels, and if straw or ice be carefully filled into the intervals in packing it will answer a good purpose, though square pans are preferable. I use snow for the sake of hastening the process of freezing. The pans are flared a little toward the top to facilitate turning out."

This excellent plan should be carefully heeded by all the dwellers upon prairies, and by a great many other people.

316. **How to Carry Ice to the Field.**—Lucius Beach, of Port Huron, Mich., says: "Many farmers do not put up ice from the supposed difficulty of using it on the farm away from the house. I have used ice-water for constant drink two summers on my farm. I happened to carry water with ice in it into the field in a six-quart tin pail with a cover to it. We used the water, and the ice was left in the pail about six hours in a hot day, and some of it still remained. I then procured a twelve-quart tin pail with cover, put in a large piece of ice, took a jug of water into the field, and turned it on to the ice as we wanted to use it. In this way it will last from six to ten hours for the use of six men, and is a luxury indeed."

317. **How to Keep Ice in Summer.**—If you have no ice-house, and buy ice, or even if you have an ice-house, and do not want to open it except at evening or morning, or if it is inconvenient to the house, and you wish to have ice always handy, this is how you can do it. Have a bushel of clean, dry sawdust, put a peck of it in the bottom of a tight barrel, having one hole for drainage, then put in a layer of lumps of ice and another peck of sawdust, and so on, covering the top tightly with sawdust, and over all a folded blanket. Do not let the ice touch the staves, and do not set the barrel in a warm place, and you will have ice all day, with scarcely any perceptible waste. Provide sawdust enough, so that you can shift the wet for dry every day. This is a much better plan than wrapping ice in a blanket or keeping it in a refrigerator, because the best of these useful articles of household furniture do not preserve ice, but rather waste it, and in so doing preserve the food placed in them.

318. **Refrigerators.**—No family can afford to keep house without a refrigerator—a food-preserver. We do not mean an ice-box, which, like the one above described, will keep ice, but nothing else—that is, not to any ad-

vantage. A piece of meat, placed upon ice, will keep a longer time than in the open warm air, but it does not keep as good as in dry air of ice temperature, and it spoils very quickly after it is taken off the ice. A custard pie kept three days on the ice will be slimy and not toothsome; but when kept in a good refrigerator, the pie will be as sweet and dry as it is in a pantry in cool weather; a piece of meat will keep in July as well as in January. Such a refrigerator has the ice at the top, and the air cooled by it falls upon the food below, or on a shelf alongside of the ice, and is as dry as any other cold air. A box of fine charcoal, kept in the refrigerator, and changed every month, will absorb all the unpleasant odors and keep the air sweet. Such refrigerators are common now in New York in families, and some of the butchers have them large enough to store the quarters of a bullock and several sheep and calves. And some of the packing-houses have them large enough to store and cut and pack, in a winter atmosphere, several hundred hogs a day. Without such "cooling-rooms," the summer slaughtering of butchers' animals could never be carried on to the great extent it is in all the large sea-board cities. This is one of the great inventions of the present age. These improved refrigerators, of suitable size for families, cost from $15 to $50 each. Ours, which cost $25, is worth $10 a year—has been in use five years, and is just as good as ever, and we see no reason why it will not be so ten years hence. It is better than none, even without ice, as it preserves an even condition of temperature. Every farmer should have ice, and no one should be without a refrigerator in some very convenient locality near the kitchen cr store-room.

SECTION XVI.—THE BARN AND ITS APPURTENANCES.

OF all that might be profitably said under the title of this section were given, we should require a whole volume instead of a few pages, which is all the space we can allot to the important subject.

A farm without a barn is only to be tolerated in a new settlement, as in some cases on the great prairies, where the land can be got under cultivation before the owner can erect the necessary buildings. Even there, we have always noticed that the most thrifty farmers were those who erected the best barns, at the earliest moment practicable.

The barn and its appurtenances, treated of in this section, contains information that will be found valuable to every one who owns, or ever expects to own, a farm.

319. **The Use and Value of Barns, and their Location.**—Of course, a good barn is one of the great essentials of a farmery—one that can

not be dispensed with. Grain and hay may be preserved in stacks or barracks, but the one can not be threshed and cleaned out-door without waste, and the other can not be fed to the stock to good advantage anywhere but in the barn. A good house and convenient out-buildings are comfortable; a good barn is one of the grand necessities of good farming.

No farmer can afford to do without one of sufficient size to accommodate all the purposes for which a barn is appropriate. We have rarely, if ever, seen upon a well-cultivated farm a barn that was too large. In nine out of ten cases the barn is too small. After it is too late, the farmer regrets that he had not built it larger. But lack of size is not so great a fault as wrong location, for you can build to the original, by a lean-to upon one side, and open shed or stable on the other, or an entire new building adjoining, so as to make the whole quite as convenient as though all built together in one building. But if the location is wrong, it never can be righted. So, in building anew, make this a question for careful consideration: "Where shall I place my barn?" And do not place it until you know that you are right.

We will point out a few essential things about location, which we think may be of service to those about to build barns.

First, a barn never should be set up-hill from the house, where by any possibility the drainage either on the surface, or under it, should come down about the door, or into the cellar or well. Wherever the situation will admit of it, place the barn on a lower level than the house, and northerly or westerly from it, and do not be afraid to give a good distance between. You had better walk an extra hundred feet all your life than have a hundred foul smells creeping into every room in your dwelling.

Secondly, never build your barn upon the roadside. Upon the road, only a mile long, which we daily travel between our own home and the railroad station, there are four barns, located upon just such situations as are very common in all hilly regions, the face of a hill, which gives most excellent natural drainage—but unfortunately for good economy, the drainage is directly into the public road.

Another thing in the location of a barn should be had in view, and that is convenience of access. For a large farm, a hillside barn, that can have a drive-way into the second or third story, affords a great convenience about unloading hay, and hauling away manure from the lower side.

A location should be chosen for a barn, so far as it can be, with reference to other important considerations, where it will not occupy half an acre, or more, perhaps, of the very best soil, about the center adopted for the farmery establishment. If you are about to make a new location for the whole of the buildings to constitute a farmery, it will be easy to have them arranged relatively right, if you first make a complete map of the whole farm, and then make your locations to suit peculiar circumstances. On a rough, rocky farm you may often save an acre of good land by placing your buildings upon ground or rock fit only to build upon, and much better for that than a rich soil.

Above all things, in selecting a site for the farmery, of which the barn, with its appurtenances, forms such a conspicuous portion, avoid locating directly upon both sides of the road, and all locations upon brook or river banks, which allow so much fertility to be washed away. And do not go to the bottom of the hill because there is a natural spring there, or because you can dig a well so easily. You can have a cistern anywhere near a roof, if you can not get a well. Do not locate on the very pinnacle of the hill—it is too bleak, even in quite warm latitudes. If you place the house on the hill, you need not put the barn, like one I see almost daily, on the top of the highest pile of rocks in the vicinity—a spot bleak enough to blow the hair off a cow's back.

Having said this much of the most important question, we will now introduce some descriptions of a few of the best barns in this country.

320. **Barn built by the Shakers, Canterbury, N. H.**—The location of this Shaker society is about fifteen miles north of Concord, N. H., and nine miles east of Merrimac River. The society is composed of three families, and owns about 2,500 acres, lying in nearly a square form, in the center of which are their substantially built and commodious dwelling-houses and numerous other buildings, all of which are painted of lightish colors, and kept in the most complete repair and neatness.

The main body of the barn is 200 feet in length by 45 in width, with 34 feet posts (three stories high). The roof is nearly flat, double boarded, then covered with three layers of stout sheathing paper, saturated with coal tar, upon which is spread a thick coat of coal tar and screened gravel. There is a projection at each end of the barn, 25 feet in length and about 16 in width, so that the whole length is 250 feet. The whole structure is well boarded. The sides and ends are covered with 16-inch pine shingles, laid four inches to the weather. There are three floors, extending the whole length of the main body of the barn. The ground upon which the barn was erected was nearly level, but at great expense a drive-way has been graded, of easy ascent, so that the loads of hay are driven on to the upper floor, over the high beams, so that, in unloading, the hay is pitched down, instead of up. This makes a material difference in forking over 200 tons of hay each hay season. The floors, ceilings, partitions, etc., are all planed and finished off as handsomely as farm-houses formerly were. There are two hovels on the lower floor, extending the whole length of the main barn, the eastern portions of which are arranged for tying up 23 cows in each, with sliding stanchions. The cows have been so trained, as they pass in the hovel each one takes its own place with the regularity of well-trained soldiers, and by a simple contrivance—the turn of a short lever—the heads of all the cows are fastened or loosened, quicker than any one could be tied by a rope. Each cow is named, and, like the "world's people," they select fancy names for their cows, such as Rosa, Lady Grace, Julia, Bustle, and Crinoline, each of which is printed in large type on slips of pasteboard, and tacked upon the joists over each one. Upon the roof are three large, handsomely finished ventilators, with Venetian blinds. The cellar, 200 by 45 feet, is of good depth; the walls are of split granite, pointed with cement. Large wooden tubes pass from the cellar through the roof, which effectually carry off the heated foul air of the manure. From the south side of the center of the barn described, a two-story building extends, south, 100 feet by 27. The upper part is used for storing hay, grain, straw, etc.; the lower, for calf-pens, store-rooms, and hospital for sick animals, with a nicely fitted up room for the herdsman. The roof of this, like that of the large barn, is nearly flat, tarred and graveled, and shingled upon the sides and ends, as is, also, a new sheep-barn, built adjoining. This runs from the southeast corner of the large barn, 108 feet long by 43 wide. The drive-way floor of this is 17 feet wide, so that two teams can stand abreast, and at the south end the floor is wide enough to allow the turning about of the team, so that the oxen passing out go before the cart, instead of the cart going out first—for the south end is not graded up so as to admit of driving through, as in the large barn.

Another addition was planned, that is, a long shed, extending from the southwest corner of the barn 100 feet. This will give two barn-yards of about 100 feet square each, well sheltered, all but the south, with both yards well supplied with water.

As the Shakers are famous for good barns, we shall give the description of another one of theirs. We have great confidence in the economy of the form of the one next described, as well as its great convenience.

321. **A Circular Barn.**—The Shakers of Berkshire County, Mass., have a barn that is worthy the attention of farmers who are contemplating the erection of barns upon a large scale. We should think that on some accounts it would be a good form to erect upon large prairie farms. We recommend its form for adobe buildings and concrete walls, as one best adapted to withstand the force of hard storms, as well as the form most economical for the room inclosed. The barn owned by the Shakers is 100 feet in diameter, built of stone—a material that is very abundant in that part of Massachusetts. It is two stories high, the first one being only seven and a half feet between floors, and containing stalls for seventy head of cattle, and two calf stables. These stalls are situated in a circle next the outer wall, with the heads of the animals pointing inward, looking into an alley in which the feeder passes around in front of and looking into the face of every animal. The circle forming the stable and alley-way is fourteen feet wide, inside of which is the great bay. Over the stable and alley is the threshing-floor, which is fourteen feet wide and about three hundred feet long on the outer side, into which a dozen loads of hay may be hauled, and all be unloaded at the same time into the bay in the center. There should be a large chimney formed of timbers open in the center of such a mass of hay, connecting with air tubes under the stable floor, extending out to the outside of the building, and with a large ventilator in the peak of the roof. We should also recommend an extension of the eaves beyond the

outer wall, by means of brackets, so as to form a shed over the doors, and the manure thrown out of the stable and piled against the wall.

In the barn mentioned there is a granary projecting into the circle of the bay, which we do not exactly approve, preferring the granary in a separate building, to which grain may be conveyed through spouts, if the barn is located upon the hillside, which is preferable on account of entering the threshing-floor on a level, though that is not indispensable, as a wagon-way can be graded up from a level plat.

322. **Barn Foundations.**—The stone foundation of a barn should never be laid in mortar. This is an error that should be avoided, as unnecessary and unprofitable. It would be even better to place the sills upon pillars, leaving a free circulation, and space high enough to furnish shelter for all the poultry in winter, and thus keep them out of the inside of the barn, where they are a nuisance. The main object, however, is to give free circulation of the air, to drive out all foul gases, and promote the health of animals. The surface must be so graded that no water will stand under the barn.

323. **Opinions of Practical Farmers about Barns.**—At a Farmers' Club in West Springfield, Mass., after consultation and debate, it was decided that a large barn was better than two or more small ones; that a tight barn was better, even for badly-cured hay, than an open one; that a brick barn and a slate roof were the best and cheapest for a man who has all his materials to buy; that a good connection between a house and barn is a covered walk, overhung with grapevines; that economy of roof and convenience for work were of the first importance in any building; that warm water and warm stables were essential to the comfort of animals; that the housing of manures was judicious; that liquid manures are largely lost, even by those who have cellars and sheds for storing them; and that the best absorbents of liquid manure are buckwheat hulls, leaf mold, sawdust, fine sand, dried peat, turf, and straw.

The meeting was held at the house of one of the members—an old-fashioned two-story building—with modern furniture and fixtures, where the well-spread tables were bountifully loaded with fat chickens, mealy potatoes, light bread, yellow butter, melting cheese, with pies and cake to match, all lavishly bestowed, and such conversation ensued as would, if it could be imitated in every neighborhood, prove of great benefit to the people. Let the plan be imitated. If not the plan of the barn, certainly the plan of meeting with your neighbors, and talking over the subject, as to whether you shall build a large or small barn, and of what materials. It is also very important to every one about to build, to go about, far and near, and look at all the barns of various sizes, forms, and fashions, and talk about their conveniences and the reverse.

324. **Barns Boarded Tight or Open.**—Whether barns should be tight is one of the most important questions that a farmer can consider; for it may involve the health and lives of all his farm stock. It is contended by some writers, with a good deal of reason, that open barns are more healthy for

stock, particularly the bovine portion, than closely boarded ones. A communication from a farmer in Maine says:

"Several years ago, I learned by experience that tight barns were not healthy for cattle, and a little reasoning upon the subject will explain why this is so. It is a well-known fact, that the droppings of cattle, both solid and liquid, exhale a vast amount of gases of different kinds, and these gases are unfit for respiration; if cattle are deprived of air, and breathe these gases, they die instantly, and if they breathe air impregnated with a large proportion of these gases, they sicken immediately; the disease most likely to be produced is pneumonia, or inflammation of the lungs, as the poison is applied directly to them.

"Now what provision is made in modern tight barns to get rid of these gases? Why, there is a ventilator on the top of the barn, but how are these gases to get to the top of the barn, since a large proportion of them are heavier than atmospheric air? The carbonic and sulphurous gases, which are more abundant than all others, are heavier than air, and consequently will not ascend; ammonia is light and would fly away, but the carbonic and sulphurous gases, having a strong affinity for ammonia, seize the fugitive, and by a chemical action a new compound is formed heavier than air, which, of course, must remain, unless there is some underground passage by which it can escape. If there is no place for its escape, these gases accumulate until the barn becomes filled with them, the hay is impregnated, and the stock has to eat as well as breathe this noxious matter, and the trouble is worse if the stock is high fed. First, because high-fed animals have a greater amount of blood, the blood-vessels are fuller, and consequently a greater tendency to congestion. Secondly, because the excrements of high-fed animals evolve a much greater amount of gases than those of others, and the difficulty of ventilation is increased by the fact that these gases are so nearly of the weight of air. If they were all light, like carburetted hydrogen, they would soon escape at the top; or if they were heavy like water, or even pure carbonic acid gas, they would, in most barns, find cracks sufficiently large to run out near the bottom; but as the facts prove that the gases are nearly of the same weight of air, I am led to the following conclusions:

"First, that the walls of barns should never be clapboarded; then there will be a gentle current constantly passing through the barn, and the gases passing out of the cracks on the leeward side; second, that the stable for horses and cattle should extend from one end of the barn to the other, with a door at each end, both of which should generally be open excepting in severe cold weather, and in storms. I have found by experience that a horse kept in a small, tight stable, will commence coughing in a very few days. Cattle do not suffer with the cold (unless the cold is extreme) if they are in good health, are well fed, and have a dry, clean stall, and plenty of good air to breathe. The lungs of an ox will manufacture a vast amount of animal heat. I have known a cow to be wintered with no other shelter than an open shed, more than two hundred miles farther north than Massachusetts, and she gave milk all winter, and came out well in the spring."

There is something worth a thought in this matter about airy barns. We know them to be the best for hay and grain; and we know that in olden time in New England, all of the barns, covered with upright boards, put on green, had wide cracks from top to bottom, and in such stables, although very cold, the cattle wintered well and kept healthy. It is shelter from storms, and not shelter from cold, that all of our stock needs.

325. **Ventilating Hay-mows.**—One of the worst practices of farmers, in New England particularly, is storing hay in large bays, without a sign of any ventilation under the bulk, which usually rests upon a few loose poles or boards on the damp ground. A bay should have ventilation, not only under it, but up through it, by means of a chimney made of four poles fastened together by rounds like a ladder. A loose stone foundation could be laid for the hay bottom, with an air-chamber from the outside leading to the chimney, directly over which there should be a ventilator in the roof. This simple contrivance would not only save many a tun of hay from mustiness, but it would enable the owner to put in his hay in a much greener state, and that which is next the chimney would always come out very sweet.

326. **Stables—how to Construct them.**—A stable should be built with a view to several points, among which we may mention economy of space consistent with comfort, convenience of feeding and milking the animals, convenience of tethering them so that they may have the largest measure of liberty of motion, but be unable to injure one another; convenience of getting hay from the loft and grain from the bin to the stalls; and convenience of removing the liquid and solid excretions, so as to preserve their quality, and remove them so speedily that the effluvium may not be breathed by the cows

The floor of a cow-stall of a well-constructed stable is four feet to four feet six inches long, raised two or three inches for a dry platform. Behind the platform the floor is made of white-oak slats set apart so that the urine may drop through to the cellar beneath. The floor-beams are laid four feet apart. On the sides stout cleets are nailed, and on these the $2 \times 3\frac{1}{2}$ white-oak slats are dovetailed and firmly nailed. The slats are beveled to a sharp edge beneath, so that the manure will not clog the open spaces, but drop clear as soon as it sinks below the upper edges of the slats. The slatted space is a foot and a half in width. Behind that the first plank of the floor is made to lift like a trap-door, turning on hinges, to secure an open space through which to hoe the droppings, litter, etc., that would not readily pass between the slats. By this simple contrivance the droppings of thirty cows can be removed in a few minutes.

327. **Stables should always be built high**—that is, high between floors. Most stables are built low, "because they are warmer." But the builders forget that warmth is obtained at a sacrifice of pure air and the health of the animal. Shut a man up in a tight, small box; the air may be warmer, but it will soon lay him out dead and cold if he continues to breathe it. If stables

are tight, they should have high ceilings; if they are not tight, but open to the admission of cold currents of air from all directions, they will be too much ventilated, or, rather, ventilated in the wrong place. One of the cheapest modes of ventilation is to build the stable high, so as to give room for the light air to rise above the heads of animals. The grand rule that must be observed is not to confine a beast in a room so small that its breathing will soon poison all the air unless the foul portion can escape and fresh air enter.

328. **Cattle Sheds that Cost Nothing.**—It is an act of wanton cruelty to expose stock to the blasts of winter without shelter. In a country of saw-mills, how cheaply a shed can be built of slabs nailed to rough posts, set in the ground, and roofed by laying one course of slabs round side down, and the upper course round side up! The cracks of the sides can be battened with thin strips of slabs or refuse boards.

In a wooded country, where sawed stuff can not be had, how cheaply a side of round logs can be built and cracks daubed with mud. Then an excellent roof can be made of split stuff, called shakes in some places and clap-boards in others, being split 2½ to 5 feet long, and 4 to 6 inches wide, according to the quality of the timber for riving. These laid upon round ribs, and held in place by weight-poles, make a roof, though rough in appearance, as tight as a shingled one. If bark is peeled at the proper time and laid at once, or piled and dried flat, it makes a pretty good roof, still cheaper than one of shakes, though not so durable. We have seen a very good cattle-shed roof made of hemlock boughs, laid on in courses, butts up.

Cheap sheds on the prairie, where cattle are exposed to winter blasts more than in any other locality, can be made so easily that it seems worse than cruel—it is wicked—to leave the poor brutes exposed.

Where rails are to be had, lay up a double wall of rails a foot apart, by using cross-pieces at the end, and fill up the space with sods, or with earth and leaves, or brush, or with coarse manure, or moldy hay and straw, such as cattle will not eat out, and you have a good wind-breaker. Extend from this wall, to the south, rails or poles to rest upon a girder on posts, and stack hay or straw on top, and there is a shed. It costs but little more to stack hay in this way than it does to make a suitable stack-bottom, and then fence the stack. As the hay is fed off in winter, fill up the space with refuse hay and straw, so as to break the wind, if it does not stop all the rain. Such sheds for sheep are very valuable.

Where rails are scarce, a good wall can be made of prairie sods laid up in courses, with hazel brush or small limbs to bind the sods together, to give strength and prevent cattle from hooking the wall down. On this wall lay a plate to support the floor of the stack or roof. Such cattle shelter pays its cost every winter. There is straw enough burned or wasted every fall, upon the Western prairies, to shelter all the stock every winter, if it were put up in some such cheap form as we have indicated.

329. **A Valuable, Cheap Feed-Trough.**—One of the puzzles in building horse

stables has been how to make the feed-troughs. We can solve that difficulty. We have learned how to make a horse feed-trough. Or, rather, we have learned how to purchase a very good and very cheap one. We learned it of a progressive young farmer. The farm of Josiah Macy, a Westchester County farmer of the old school, is conducted by his grandson, who has gained knowledge from books, and goes ahead with improvements, one of which is a new feed-trough. It is simply an iron pot—just such a one as our dinner used to be boiled in before the age of cooking-stoves. One of about four gallons is a good size, and it is set in the corner of the manger, in a casing of boards that inclose the rim, just up even with the top. It is superior to any wooden, iron, or stone feed-box we ever saw; is not expensive, and, barring accidents, it will last forever, and be a good pot afterward.

330. **Earthen Stable Floors.**—One of the best substances that can be found for flooring for horses is clean sand. It is superior to wood, as it does not heat and injure hoofs. Some English veterinary surgeons use nothing else for bedding but sand. We have always found stables with dirt floors preferable to plank ones.

331. **The Stable Yard.**—The stable, or barn-yard, is one of the most important appurtenances of the farmery. Two grand objects must be kept in view in its construction—the comfort of the animals and the preservation of the manure. If it is on soft soil, and tolerably level, as such yards are upon nine out of every ten of the Western prairie farms, they are most uncomfortable places for stock, although good for preservation of manure, but that is little or no object where it is of so little value. The only help that we can see for a barn-yard upon such soil, where the tramping of cattle makes it into a quagmire, is thorough underdrainage, and scraping the earth from around into a low mound, and covering the most of that with sheds. It may be so constructed that all the drainage of the manure will concentrate in one spot, to be absorbed by straw or other manure-making substance. We have found paving a yard with common fence-rails, where stones could not be procured, paid the cost every year, and such a pavement will last half a dozen years.

In a rocky country, like eastern New York, Pennsylvania, and the New England States, if care and sound judgment are used in the location of a farmery, the yard can be fixed on the southerly side of the barn and sheds, where it will always be dry, and very comfortable for stock, and yet not wasteful of manure. Our own is located upon a rock, sloping southeast. Just outside the fence, at the lowest corner, an excavation is made, to be kept full of muck, sods, or other absorbents, so that while the yard is constantly drained, the drainage is not lost. Some very good yards we have seen constructed with a deep basin in the center. The great objection to this form in a small yard is that the basin sometimes gets so full that there is not dry space enough around the edges for the cattle. Sometimes, too, it freezes over quite full, and strong cattle push the weaker ones upon the ice to their injury. We prefer the absorbing basin outside of the yard.

332. **The Hen-Roost.**—Every farmery must have a hen-roost, if it does not have a poultry-yard; and this should not be an open shed, nor a cold open room, but one so arranged that it will be well sheltered from cold winds and storms, and lighted by a glass window upon the sunny side or in the roof. It will also be found a most excellent provision to give hens access in winter to a cellar, where they can scratch gravel and wallow in dust. The hen-roost, too, should be arranged with special reference to saving all the droppings of the fowls, because it is the most valuable manure that is made about a farmery.

SECTION XVII.—WATER FOR THE FARMERY.

ABOUT half of the farms in the United States are deficient in water—that is, the water is not convenient for stock; and in many situations cattle can only be watered by pumping, or by the still more tedious process of drawing water in a bucket from a well. This is a serious piece of labor, and a useless one, because the wind can be made to do the work a great deal better, cheaper, and more certain; and the whole expense of a wind-mill, pump, and putting into operation, in a well twenty feet deep, would not probably exceed $50.

You may use any one of a dozen iron pumps, to be found in almost every hardware store. Our own choice would be West's Anti-Freezing Pump, which is made of iron, and is very durable. The wind-mill for the motive power is simplicity simplified. The wind-wheel is four feet in diameter, divided into eight parts, curved from the center, just as we used to whittle out wind-mills from a pine shingle forty years ago. The wheel may be made of wood or iron. If of wood, fix the points of the sails in a wooden hub and secure the outer ends by a rim, just like that of a large spinning-wheel. Fix this wheel firmly upon an inch iron-bar, say two feet long, with two bearings to run in iron or hard wood; and a crank in the center suited to the stroke of your pump. If the valve works four inches, make your crank short two inches. Now make a frame of three pieces, three quarters of a square, with bearings for the wind-wheel shaft upon two, and an inch and a quarter hole in the center of the other piece. Upon this frame attach a vane of strong, thin wood, about three feet long and one foot wide at the outer end. Now erect a gallows-frame seven feet wide and fifteen feet high over the pump, fixed with a pipe in the well. No matter whether that pipe is straight or not. Now put a bolt, with a big head and washer, through the hole in the frame that holds the shaft, and through the center of the cross-piece of the gallows, so that the small frame will be held firmly by the head of that bolt, yet will turn freely in the wind. From the piston-rod of the pump, extend a rod with a swivel-joint in the center to the crank, and, let the wind blow high or low, you will have the satisfaction of knowing that your cattle are supplied with water. It is a good plan to make a cistern to hold a supply in case the pump stops at any time for repairs or want of wind; the latter will not be apt to occur, as it will run with a very slight breeze. From your watering-tub or trough, conduct a pipe back to the well, and you need not fear frost unless the pump stops. By making use of a force-pump you may get a supply from a well in the valley up to your house and barn on the hill, or to irrigate your garden. See Nos. 369, 370.

How to get water most convenient to all parts of the farmery should be the leading consideration; because water is indispensable—neither man nor beast can do without it a single day. All else may be inconvenient—water should never be. It should be brought in pipes from a higher level, whenever it is practicable at any reasonable expense, because that is the most convenient of all forms in which water can be had at the farmery; and no farmer can afford to neglect to supply his place with water, if he owns a spring or stream that would afford such a supply, because it is the greatest labor-saving fixture that he can make.

If aqueduct water can not be had, then convenient wells and pumps should be; and if water can not be had by easy, shallow digging, in wells, it can and should be in cisterns: and upon this question we will give some useful information.

333. **Economy of Aqueducts.**—Some farmers neglect to make provision for watering domestic animals until drought actually arrives, and then they can not. We well knew one who, during a drought, drove his cattle a mile to water, at the same time that he had roof enough on his large barn to give them all the drink they needed, if a cistern of proper capacity had been prepared to retain it. The barn cost $1,000—the cistern might be built for $50—yet every animal of his large herd must travel miles every week for necessary drink. He might construct a cistern now, but it will be another year before he can derive benefit from it, and so he puts off the labor.

There are many others who do the same. We know another farmer, who has lived till past eighty years of age upon a farm where there is a gushing spring of excellent water within sixty rods of his house and barn, high enough to run through pipes over the top of every building, yet this man draws water with a bucket from a well, which sometimes fails, when he has to go to a more distant and inconvenient well, or haul water in barrels from the river; and his stock, all the long winter, go down the road to the riverside for drink, wasting time (and that is money) and manure, to replace which he buys fertilizers. Saving the first cost of an aqueduct, in such cases, is not saving money. Neither is the neglect to construct cisterns a good piece of economy.

334. **Value of Cisterns—their Size and Contents.**—No man, whose only supply of water is in a deep well, or where the well or spring water, however convenient, is hard—that is, like all the water of limestone countries, unfit for washing, or making butter—can afford to do without a cistern. If the earth where the cistern is to be built is compact clay, it can be dug out in the form of a jug, with only a man-hole at the top; and in all ground but caving sand it can be dug and plastered without any brick walls, and the top covered with durable timber, which should be placed at least four feet from the surface to its under side, as it will, when thus covered, last enough longer to pay for the extra work. Wherever flat stones abound, a moderate-sized cistern should be covered with them, laid shelving over each way, if not large enough to reach clear across. The earth-bottom and walls are easily made tight by cement (water-lime mortar), made with three parts of clean, coarse, sharp sand to one of lime, which has to be wet up only as it is wanted for use, or it will set wherever it has a chance to dry upon the bed where mixed. It should be very thoroughly worked in, mixing while pretty wet, and plastered on the bottom first and then up the sides, one coat after another as fast as one is dry—two or three coats—taking care that no defect is made in the joining of the sides and bottom together. The bottom should be dug hollowing, and corners full; and to save cement, any little inequalities in the walls may be filled with clay or lime-mortar before putting on the cement plaster. In situations where cement can not be obtained, a good cistern can be made as follows, which will last a dozen years certain. We know one good at twenty years old. Take one and a half-inch plank, six or eight feet long, six inches wide at one end and six and a quarter at the other; joint and dowel the edges, and fit the ends with a croze upon heads six or eight feet across, and hoop just enough to keep together to roll into the hole, biggest end down, upon a soft mortar bed of clay, four inches deep; then fill the space between the tub and walls, which should be four or six inches wide, with clay just moist enough to tamp in the most compact manner, and the cistern will never leak, and will give great satisfaction for its small cost. The top should be covered over with timber and earth, deep enough to keep warm in winter and cool in summer.

Upon the roof of a barn 35 by 70 feet—if three feet of rain fall annually—three cubic feet of water will be afforded by every square foot of surface—more than 7,000 cubic feet from the whole roof—which would be about 1,700 barrels. This would be enough to water daily, *the year through*, thirteen head of cattle, each animal drinking four twelve-quart pails full per day. But if the water were reserved for the dry season only, or when small streams are dry, thirty or forty head might be watered from one roof.

People are apt to make their cisterns too small, so that often they do not hold a tenth part of the water from the eaves. In the above-mentioned instance it would not be necessary to construct one large enough to hold the entire 1,700 barrels. If the cattle were watered from it the year round, and its contents thus constantly drawn as it fills, one large enough to hold 400 barrels would do; but if needed for the dry season only, it should be more than double. A cistern fourteen feet in diameter and twelve feet deep would hold about 450 barrels—twenty feet in diameter, and the same depth, would be sufficient for 900 barrels. If built under ground, and contracted toward the top, it would require to be a little larger in dimensions, to allow for the contracted space. Such a contraction would be absolutely necessary to admit of convenient and safe covering at the top, and could be effected without any difficulty if built of masonry. The pressure of the water outward would be counterbalanced by the pressure of the earth against the exterior, especially if well rammed in as the wall is built.

There are some portions of the country where the subsoil is underlaid by slate or other rock which may be excavated. In such cases, it sometimes happens that with a little care in cutting, the water-lime mortar may be applied immediately to the rocky walls, a shoulder above being made on which to build the contracted part of the wall.

We have such a cistern, dug in tolerably compact earth, and plastered with cement, put on in two or three coats, using about two and a half barrels for a cistern eight feet wide and six feet deep. It was designed to be deeper, which would have made a better proportion, but the excavators came upon a ledge that could not be blasted, and was very difficult to pick up, and the bottom being very rough, required more plaster. The top is covered with chestnut plank, over which is earth, and the water is let in through a pipe beneath the surface, and taken out by another that leads to the pump in the kitchen. There is also an outlet pipe under the covering for surplus water, so that when full, there is a body of water five feet deep by eight wide, and this gives about sixty barrels; and being supplied by 1,600 superficial feet of roof, is not likely to fail for family use. The water is perfectly filtered by the most convenient filtering arrangement for a cistern that we ever saw.

This is by Peirce's patent porous cement pipes, which are laid in a sort of net-work in the bottom of the cistern, and the pump-pipe attached to them, so that no water can reach the pump that has not passed through the substance of the pipes, which are in appearance much like solid stone, and more than an inch thick, which certainly forms a very perfect strainer to free the rain water of all impurities. A writer in his recommendation to everybody to build cisterns, says:

'I have one in my house cellar, entirely below the bottom of the cellar, six and half feet deep and five and a half in diameter, holding about 1,000 gallons. It was dug six feet eight inches deep and seven feet in diameter. The bottom being made smooth, was laid over with brick. The mason then began the side with brick laid in cement, leaving a space all round between the brick and earth about five inches. After raising the work about eighteen inches, he carefully filled the space between the brick and side of the hole with earth, well and carefully pressed down. If you wet the earth or clay as you fill it in, it will be more compact.

"When you get within about two feet of the top, commence gradually to draw in the work toward the center, leaving, when finished, a space open about two feet across. The next thing is to plaster the inside with cement; also the top on the outside, commencing where you began to draw in. About two courses of brick are laid round the mouth of the cistern, forming a neck, which adds to the strength of the top. Now cover the whole with earth, except the neck. The water is conducted to my cistern through a small brick drain laid in cement. I also have a drain near the top to let off the surplus water. If a cistern is made out of doors, it must be below the reach of frost. Lead pipe would probably be cheaper than brick to conduct water to and from the cistern.

"I have no doubt but that a cistern made this way of hard brick would last a century. Mine, holding 1,000 gallons, cost $18. The larger the size, the less the cost in proportion to the capacity. If the earth is firm and hard, you may lay the brick close against it, thus saving the trouble of filling in and digging so large. I have known them made by cementing directly on the earth, using no brick, and covering the top with timbers or plank. One made with brick will cost more, but I think it best and cheapest, taking into consideration safety and durability."

TABLES OF CONTENTS OF CIRCULAR CISTERNS.—The following tables of the size and contents of circular cisterns may be convenient to those about to build them. For *each foot of depth*, the number of barrels answering to the different diameters is as follows:

For 5 feet in diameter	4.66 barrels.
6 " "	6.71 "
7 " "	9.13 "
8 " "	11.93 "
9 " "	15.10 "
10 " "	18.65 "

A cistern $3\frac{1}{2}$ feet diameter will hold for every 10 inches in depth	59 gallons.
" 4 " "	78 "
" $4\frac{1}{2}$ " "	99 "
" 5 " "	122 "
" $5\frac{1}{2}$ " "	148 "
" 6 " "	176 "
" 8 " "	310 "

You will find by this table that a cistern six feet deep and six in diameter will hold 1,260 gallons, and each foot you add in depth will hold 210 gallons. Therefore, one ten feet deep and six in diameter will contain 2,100 gallons.

To find the contents of any cistern in wine gallons, the diameter and depth being known:

1. Multiply one half the diameter (in feet) by itself.

2. Multiply the above product by $3\frac{1}{7}$, which will give the area of the bottom of the cistern *nearly*.

3. Multiply this by the number of feet in depth; this will give the cubic contents in feet.

4. Multiply the last product by 1,728 (the number of cubic inches in a foot), which gives the number of cubic inches.

5. Divide the whole result by 231 (the number of cubic inches in the wine gallon), and the result will be the number of gallons in the cistern.

Divide the gallons by 30, and you will have the number of barrels, and thus you can calculate how large to make a cistern for the use of house or barn; and be sure not to neglect so important and so inexpensive an improvement as making a cistern.

335. **Digging Wells.**—There is no better improvement put upon a farm than wells, either in their every-day convenience or value in estimating the price of a farm. In some localities it will pay to dig a well at the house, at the barn, in the stable-yard, and in almost every field. In compact earth, a well can be dug without curbing to support the earth sides during the excavation.

Where curbing is necessary, the best way to do it is to build the wall upon a wooden or iron ring, and let that down as the excavation proceeds, adding brick or stone at the top as fast as may be necessary to keep the wall even with the surface.

336. **Horizontal Wells.**—Here is a new idea for dwellers in mountainous, or even moderately hilly districts to think of. Mining after coal in Pennsylvania, and gold in California, has clearly illustrated the fact, that wells may be dug into hillsides, or banks, or bluffs, as well level or horizontally, as down perpendicularly, which would save dangerous and severe labor. Water, so troublesome in digging common wells, has not to be bailed in the horizontal, as it takes care of itself. The certainty of discovering or cutting off veins of water is greater with the horizontal well than the perpendicular, if it starts in near the base of a hill, or anywhere as much below the surface as a common shaft would be likely to be sunk. By laying down wooden rails, all the dirt can be brought out in a little railway car, and the stone or brick carried in to build the well as fast as the digging progresses. It will not be necessary to make a horizontal shaft any larger than a perpendicular one, though it should be of a different shape. We would make it in the form of the figure we call a naught or cipher in numerals. Two feet wide and four feet high will be large enough, with a gentle descent for the water to run to the outlet; and in many situations it can be made to run through a short pipe into the house; or if it will not run, it can be drawn by a pump through a horizontal pipe any distance.

There is another advantage in such a well. It would not be constantly liable to have things falling, or being thrown into it, and the water would remain purer.

There are a great many pastures where water for stock has to be drawn from wells, which might have a natural flow from hillsides, with an expenditure of no more time and money than is required for a perpendicular well.

There are some dairy farms that could have valuable spring-houses supplied by such a horizontal well, and such a supply of cold running water would add to the value of the farm almost as much, in some cases, as its whole value is now.

Such wells have been constructed in California, and we earnestly commend them to the attention of all the farmers in the hilly portions of the Atlantic States. In rocky hills a horizontal shaft can be drifted in much easier than it can be bored perpendicularly; and the work either in rock or earth digging can be much better done in winter in a horizontal than in a perpendicular well. We hope to see them extensively adopted.

337. **Wells on Hills.**—We have seen a great many wells on the tops of hills affording a large supply of water, while the bottom was above the plain or valley in which the farmstead was situated. How easy to obtain this water by a siphon, or a pipe inserted on a level, which can be done without digging a ditch the whole depth and distance. Ascertain where the level of the bottom of the well will strike on the face of the hill, and dig in there, and set up a frame to support an earth-boring auger, and drive a bore straight through to the well, which can be easily done one or two hundred feet, if artesian wells can be bored one or two thousand feet perpendicular. Where the distance is too great, or the hill is rocky, put in a siphon pipe, with a little hand-pump to start it, and you can always have running water in your yard or garden at the foot of the hill.

338. **Causes of Impure Water in Wells.**—It sometimes occurs that the water of a well, noted for its purity and delicious drinking quality, becomes offensive to the taste and smell without any apparent cause. Sometimes it is occasioned by surface water from an impure source finding its way to the well, after many years of exemption; and sometimes it comes from roots of trees growing into the water and decaying; and sometimes worms work their way in and decay; and occasionally rats, mice, or other pests burrow in the wall and injure the water. And not unfrequently a new vein of water finds its way into an old well and materially changes the character of the water. Generally a well is improved by cleaning, but we have known the contrary. In a well of our own, in the trap-rock district north of New York city, the quality of the water was materially injured by substituting a pump in place of a bucket. The reason was obvious. The water was seven or eight feet deep, and the bucket drew it from the surface and the pump from the bottom, and in the water drawn from the bottom we found a strong sulphur taste and smell. Cleaning it out did no good; the water at the bottom was decidedly different from the top. The only remedy, if we continued to use the pump, which was iron, and costly, and extremely convenient (it is one of Gay & West's force-pumps—very valuable for farm use), was to attach a gutta-percha pipe to the bottom of the iron pipe, and to a float, so that it would always draw the water from the surface, at whatever hight it might be in the well by the fluctuations of the seasons.

Where wells are injured by surface water, resort should be had at once to the most thorough draining. Lay tile or stone drains five or six feet deep, so as to cut off all leaking into the well. If injured by trees—which, by-the-by, should never be set near a well—dig a deep trench so as to cut off all the roots, and fill that trench with coarse gravel, or a stiff mass of clay, that will not be attractive to the roots. Remove all that you can from the wall and earth near the well, and time will cure the water. Sometimes, to get rid of roots, insects, or other pests, it will pay cost to unwall the well and build it anew. Fill in charcoal, cinders, or other sweet substances; and sometimes it will be well to lay a portion of the top wall in cement mortar.

It is recommended in all cases, where well-water becomes unpalatable, to agitate it freely, and very often. If drawn with a bucket, set a man at work pushing the bucket down deep and drawing it up full, and pouring it back again, so as to fall in the water till it is all thoroughly mixed and all the stones washed, and then when it settles clear again it will probably be found as good as ever.

This plan of agitating the water may also be applied to cisterns to good advantage.

Looking into a well, so as to see anything at the bottom, can be easily done any sunny day (the morning is the best time), by using a looking-glass so as to reflect the rays of light and throw them quite to the bottom of a deep well. We have used this means to discover the position of a bucket that had broken loose and fallen to the bottom, and then with the steelyards hung to a rope have been able to hook on to the bucket and draw it up at once. We once recovered a tin pail of butter in the same way.

339. **Self-Emptying Well-Bucket.**—If the water is drawn from a well by a bucket and windlass, two ropes are better than one. Fasten by a staple to the center of the windlass and wind each way toward the ends, so that the ropes will be widest apart when the bucket is up. Instead of a bail, attach a short chain or piece of iron rod to each ear of the bucket, and set the ears low down, so that the bucket will tip easily. Cut a hole in the bottom, four inches across, and cover it with a block coated with soft sole leather, like the valve of a pump-bucket, which will open to let in the water as the bucket descends, and close as soon as it starts upward. To empty the water easily, there are two ways—first, and best, by a flat iron hook about eight inches long, fastened to the well-spout in such a way that it may catch the edge of the bucket as it is drawn up, and tip and empty. The other way is to have a pin in the spout that will strike the valve and open it when the bucket is placed upon the spout. Two buckets with two ropes will work much steadier and easier, and in the long run cost less than with one, and the valve to fill, and hook to empty the bucket, are great labor-saving fixtures.

It is almost as important to keep water pure for stock as for family use. Pure water is a great luxury to the palate of a thirsty horse, and every man who is fortunate enough to be the owner of so noble an animal, should see that the wants of the same are properly provided for.

Unfortunately, very few persons realize the importance of supplying domestic animals with pure water; yet they stand in need of it whenever thirsty, and as a matter of profit to ourselves and humanity to them, we should see that their wants are well supplied.

Pure water is very nutritious, and as a nutritious agent its value is impaired when of inferior quality, or when mixed with indigestible foreign substances, such as are often found in watering-troughs located by the wayside.

Some very interesting experiments have lately been made on horses belonging to the French army, in view of testing their endurance as regards the deprivation of water, and it was found that some of them lived twenty-five days on water alone ; it is a singular fact that seventy-five per cent. of the weight of a horse's body is composed of fluid.

Strange water, as it is called, often has a bad effect on the digestive organs when first used, and in order to guard against its consequences, English grooms always provide for the wants of their horses, when away from home at the race-course, by furnishing them with an abundant supply of pure water to which they have been accustomed, which is transported from place to place in hogsheads.

340. **The Hydraulic Ram.**—To those who have no spring above the level of the house, but have one below, we press the subject of a water-ram—a simple, little, inexpensive machine that can be made to throw about one eighth or a tenth of the water that flows through it up a steep hill and along a pipe half a mile or more, discharging it in a cistern in the garret of a house or loft of the barn, whence it is drawn as it is wanted in any apartment, while the overflow or surplus of water will give you a constant little stream in the cattle water-trough. Hundreds of these rams are in use all over the country; but there are thousands of places where they are not in use, where equal natural facilities exist. Our object here is only to call attention to the fact, that every farmer who has a spring in a valley where he can get three or four feet fall from it to work the ram, can get a portion of that water on top of a hill; and in many places where no running springs naturally exist, sufficient water can be obtained by digging. We have seen a stream discharged at the outlet of an underdrain sufficient to drive a ram—water obtained without any expectation of obtaining it; because the object was to drain the land of its surplus water, and prevent it from oozing out of the surface of the hillside.

The house of the late John C. Stevens, at South Amboy, is 120 feet above the level of a spring, near the bay shore. At this spring he set a water-ram, with a two-inch drive-pipe, about sixty feet long, laid upon an inclination of five feet. About one eighth of the water which runs through this pipe is sent, by the action of the ram—a little affair, about as big as a teakettle—up through a small lead pipe into the house, nearly half a mile distant. Perhaps the whole may have cost $100. We know a good many places where $50 has secured a full and constant supply of water from the bottom of a hill almost impossible to climb, yet which had been climbed from the first settlement of the country till the little water-ram was set to work. We know a great many other places where it is worth a dollar a day to *tote* the water up the slippery rocks in buckets, where all that labor could be saved by an expenditure of $50, and an annual expense for repairs of a shilling a year. Yet those who own such places do not improve them, because they do not know they can.

311. **Durability of Wooden Pipes for Aqueducts.**—Charles Stearns, of Springfield, Mass., has proved by a somewhat lengthy experience that wooden pipes are nearly indestructible, if *laid deep*—deep enough to prevent atmospheric action upon the wood. His rule is six feet deep in sandy or porous earth; four feet deep in compact, clayey earth, and three feet deep in swampy earth, where the peaty condition of the soil, which is antiseptic, preserves wood from decay. Thus laid, Mr. Stearns thinks wood will outlast iron or lead; and the wooden pipes are cheaper than any material that can be used, where a bore of two to six inches is required. In one instance, an aqueduct laid by Mr. Stearns of three fourths-inch caliber lead pipe, corroded and failed in fifteen years, and had to be replaced. Another one, made with very heavy lead pipe of two-inch caliber, laid through a wet meadow, in the very kind of soil that preserves wood the most perfectly, failed so as to need repairs within three or four years, and at the end of ten years had to be replaced with new pipe, which he then made of wood, and which, after twenty years of use, is still in good order. The aqueduct pipes supplying Springfield with spring water, that comes to the surface on the sandy plains above the town, have been in use fourteen years, and bid fair to last many years longer. The bore of the logs is from one and a half to seven inches, charred on the inner surface by forcing flame through the bore, or by the insertion of a heated rod, to prevent the timber from giving any unpleasant taste to the water. Mr. Stearns thinks, from experiments made, that lead pipe will last enough longer to pay for the expense of burying it deep, or packing it closely in clay. He also thinks that the interest upon the difference in cost between well-made and properly laid wooden pipes and those of a more costly material, called indestructible, will keep the wooden pipes in repair forever. For the branch pipes leading into the houses, Mr. Stearns used lead pipes in all the houses supplied from the Springfield Water-Works, and has never known any injury to occur to any one using the water; and his own family have used water passed through lead pipe a long distance for many years, without suffering any of the effects frequently ascribed to such water; nor has he ever heard of a case based upon any better testimony than "they say so." The water that supplies Springfield comes from several springs, improved by digging, and we have no doubt that there are hundreds of other villages that might be watered in the same way, greatly to the comfort and health of the inhabitants. There is another advantage besides cheapness in wooden pipes. It is the ease with which they are tapped, wherever and whenever a branch is to be taken off, and they are also easily repaired. We hope that not only villages, but farmers, wherever a spring exists above the level of the farmstead,

will avail themselves of its benefits. Many farmers have chestnut or cedar, the best of timber, which they could have prepared at very small expense by their own hands, and get an aqueduct that would, in case of sale of the farm, pay ten times its cost; and it would be worth still more to the owner, for it would afford him a constant enjoyment.

There is a very curious manufactory of wooden aqueduct pipes at Elmira, N. Y. A large pine log is cut up into a series of pipes, from an inch bore to ten or twelve inches, taking one out of the other, leaving the sides from one to two inches thick. These pipes are then banded with hoop-iron, drawn by a powerful machine through hot coal-tar, and being buried below the action of the atmosphere, are expected to last for an indefinite period.

SECTION XVIII.—STACKING AND STORING GRAIN; CORN-CRIBS, PIGGERIES, AND PIG-FEEDING; SMOKE-HOUSES, AND CURING BACON.

ALTHOUGH, like most of our subjects, these are treated briefly, each is worthy of notice, and must have enough, if nothing more, to attract attention, so as to incite the reader to look further into the matter.

One of the indispensable buildings of a farmery is a good storehouse for grain. Upon a small farm, a room in the barn can be set apart for the storage of small grain, but it is more liable to the depredations of rats and mice than in a building made purposely for a granary. Every farmer who annually raises a hundred bushels of ears of Indian corn can not afford to do without a corn-crib, because corn can not be stored safely except in a room with very open sides.

342. **Corn-Cribs.**—The best kind of a corn-crib is a building twenty feet wide, and of such length as will give sufficient capacity—say thirty feet long—for a farm where ten to twenty acres of corn are usually grown. The sides should not be less than ten feet high, and boarded up and down with strips two inches wide, one inch apart. Six feet from the sides, partitions are made in the same way. This leaves a drive-way eight feet wide, so that you can drive in a wagon-load of corn and throw it right and left over the beam into the crib. This drive-way should be made to close at both ends with slat-gates, or lattice-work gates, so as to allow a free circulation of air.

343. **Rail-Pen Corn-Cribs.**—Cribbing corn, after the Western fashion, in open rail-pens, is considered down East a very slovenly method. Yet it is one of the best ways in which it can be stored. It is true it wastes a little

by shelling if it remains till spring, but not much if the pens are so located that the pigs and poultry can be let in to pick up the scattered grains. The way to make a rail-pen corn-crib is to take straight fence-rails, as near of a size as possible, and saw part of them into halves of equal length, so that you can lay up a pen half as wide as it is long, notching the corners so that the rails will come close enough together to prevent the ears falling out. If this can not be done with all of the cracks, they must be stopped by "chinking" from the inside, or by boards nailed over. It is usual to build the pen upon a floor of rails, which are sometimes laid on the ground, and sometimes raised upon logs, stones, or blocks. The pen should not be over eight feet high, and when full is covered with boards held on by a heavy rail or pole. In woodland regions the covering is usually made of "shakes" —split clap-boards, such as log-cabin roofs are generally made of. On the prairies, we have frequently seen straw used for a covering; and we have also seen many thousands of bushels of wheat, both in the chaff and after it is winnowed, stored in the same rude way, by simply calking the cracks with straw.

Nor is it a very wasteful way of storing wheat, if the pen is built upon a hard-beaten spot, where all the grain can be swept up when the pen is emptied.

We have also seen corn put up in rail-pens without any covering, and kept through the winter without damage, the ears being simply rounded up on top. We have often been told by those who have had a good deal of experience in storing corn in this way, that rain does not hurt it—all that does not run through dries out the first windy day. Wheat in the chaff will not injure in a long rain-storm, when simply piled in a conical heap, if it does not wet at the bottom.

Great boat-loads of Black Sea wheat are brought down long rivers, being many weeks on the passage, without any covering. The wheat is rounded up in the center, somewhat in the form of a roof, and the outside gets wet and grows into a mat, sometimes two inches thick, and that shelters the mass below. It does not strike us as an economical method, but that depends upon circumstances, as it does in cribbing Indian-corn. It certainly never would pay to build expensive cribs to store some of the great crops of the West; and it has been found good economy, for want of better storage, to let the corn remain where it grew until wanted for use. Even with smaller crops, it may not always be evidence of bad farming where we see the corn stand in shocks until wanted. It certainly keeps better there than it would in a badly ventilated store-room.

344. **Stathels for Stack Bottoms.**—In England, it is not considered good economy to build barns enough to store all the grain, and it is therefore stacked out. In this country, if economy warranted the practice of storing all under roofs, necessity would often forbid, and require our great crops of wheat to be put up in stacks. In England, upon well-conducted farms, where the practice of stacking prevails, the stathels for the stacks to rest

upon are permanent structures. Some of them are made with stone pillars and caps; and some with a wooden frame on stone pillars; and in some instances iron has been substituted for wood. The stack being elevated a foot or two, allows a circulation of air, and very much assists the curing of the grain. We recommend farmers, wherever they are in the regular practice of stacking hay and grain, to have a permanent stack yard, provided with stack bottoms, after the English fashion. Even for temporary stacking, building the stack upon the ground is a very wasteful practice. We have seen stacks upon the Western prairie built in a spot, dry at the time, become saturated with water, and half rotted two feet above the ground, before they were used up in winter. For a temporary stack bottom, there is nothing more convenient than fence-rails. We have built long wheat-ricks on the prairie in this way. We took fence-rails and laid them up as though building a worm fence, pretty straight, in two lines about two feet apart at the bottom, and about four rails high, leaning inward so that the two lines of fence touch. Against this upon each side the sheaves were set with butts on the ground, leaning toward the center until a sufficient bottom for the rick was formed. This leaves an air-pipe through the bottom, and keeps all the heads from the ground, and although the water stood some inches deep in a wet time over the spongy soil, all the wheat came out bright and sound. The butts of the lower sheaves only were rotted. The fence sustained the greatest weight of the rick, besides giving it air.

345. **The Piggery.**—No farmery is complete without a well-arranged piggery, which consists of a grain-room, a root cellar, a cooking-room, a feeding-room, a sleeping-room—all under cover. All this is requisite upon a farm where only two or three pigs are fatted annually. It is still more requisite where a dozen or more pigs are kept—where the leading object of the farmer is to convert coarse farm products into pork; except where pigs are wholly fatted in cornfields, as at the West. Upon all other farms a well-arranged piggery is indispensable, and, as we have shown in Section 11, that cooking food for pigs is advantageous, the greater the conveniences for cooking, the more profitable will be the feeding.

The best arranged piggery we ever saw for convenience and saving of labor was built upon the side of a Vermont hill, where potatoes were a leading article in the manufacture of pork. The potatoes were stored in a cave cellar, from which they were shoveled upon a screen, over which they rolled to the large potash-kettle set in an arch some twenty or thirty feet distant. Generally the potatoes thus screened needed no washing; if they did, provision was made for doing it by a copious stream of water let on as they traversed the screen. The water was let into the kettle from the source supplying the washing water. The floor where the kettle stood contained bins for meal, which were filled from the bags emptied into a spout on the outside. The cooked food was shoveled from the kettle into a hopper that conducted it into a cooling-trough on the floor below, which stood high enough to allow the swill to run through a long conductor to the feed-troughs. The objection to this last arrangement was, that the swill had to be made thin enough to flow freely. The arrangement, however, was a very perfect one, and worthy of imitation upon all similarly situated farms.

346. **Railway Cooking Arrangement for Pigs.**—We suggested the following arrangement, more than twenty years ago, for cooking food for pigs or any other stock, and we afterward had a model made and exhibited at the fair of the American Institute, which awarded it a silver medal.

This is the plan: arrange a steam chamber of any given dimensions—say three feet by six feet, and three feet high—over a furnace kettle, or anywhere that steam could be conveyed into it from a boiler. This chamber has a door at one end, made steam-tight, and rails in the bottom upon which a car travels, and these rails should extend outside to the root-bin, or meal-tubs, or reservoirs of food to be cooked. The car being loaded, is rolled into the chamber, and door closed. When the food is cooked, shut off steam and open an escape-valve, and then the door, and roll out the car over cooling vats, and open a trap in the bottom of the car, and let the contents drop. These cooling vats may be placed near enough to dip the swill into the feed-troughs, or it may be carried in another car along an alley, and thence dipped into the feed-troughs, or made to run into them through conductors. Such an arrangement would, without doubt, save a great deal of hard labor, and it would not be very expensive. Whatever the arrangement of the piggery, keep this fact constantly in view, that in some sections of the country the manure which you can make while fatting your pork, if your piggery is well arranged, will prove to be the most profitable part of the pork-making process.

There is another necessary farm-building which we may as well speak of here, particularly as it is one that may, whenever the situation will admit, very properly be located in the immediate vicinity of the piggery, and it is equally valuable to the farmer as a mine of manurial wealth. It is—

347. **The Temple of Cloacina.**—Every farm-house must have a temple set apart for this heathenish deity, but no farm-house should have such a necessary appendage a disgrace to civilization, as too many of them are. Such a building should be placed convenient to the house, but never in sight. It should be located in a clump of shrubbery, mostly evergreens, out of sight from the house, or else it should be made part and parcel of some of the out-buildings, so as never to be a prominent object. We have often seen these buildings so placed that they were the most conspicuous things about the place. A very little refinement in a farmer's family will make it revolt at exposing the part of a farmery that should be hidden from public gaze. A very little knowledge of the deoderizing effect of fine, dry, swamp muck, or charcoal, or plaster, or copperas will serve to keep a place that must be visited every day, by every member of the family, so sweet that it never will be offensive; and the valuable contents of the vault, which should be always shallow and easy to clean, will then become a source of profit, instead of a nuisance both disagreeable and disgraceful.

348. **Smoke-Houses—How to Build and how to Use Them.**—We lay it down as an axiom, that the best smoke-house ever built is a log cabin, with the cracks all open. In such a building you can not confine the smoke so as to smother the meat and spoil it, as it easily can be and often is in a very tight room. It is not generally understood how much the excellence of bacon depends on the manner in which it may be smoked. Indeed, we look upon this part of the process as more important than a good receipt for pickling. A ham that is well pickled may be spoiled in smoking it, and then no skill in cookery will take away its dark color and strong, rancid taste. To make good hams, there must be a free circulation of atmosphere, so that the smoke never shall become heated. A smoke never should be made in a damp, foggy, or rainy day.

In building a smoke-house the farmer is more apt to regard external appearances than the object for which it is intended. It may be very strong and neat, but if it be built on wrong principles, it will never give satisfaction, and the good wife will be always wondering how it is that her bacon is not equal to that which she eats away from home. Now, there is no bacon in this country superior to that produced in Maryland, where the smoke-houses are certainly rather primitive in their construction. They are usually made of logs, rudely plastered with clay on the outside, and thatched with straw. The hams are hung upon hooks driven into the rafters. The fire of chips—covered with saw-dust in order to prevent a blaze—is in the middle of the floor—ground floor, generally; and the smoke, after having done its duty, escapes through the innumerable cracks and openings in the wall and thatch. Such a building is not very ornamental, but it is much more efficient than those we frequently see constructed of brick or stone, with tight roof, a close-fitting door, and but one small aperture for the escape of the smoke. The great secret in the art of smoking hams is to dry them in smoke, but not by heat. When they are kept close to the fire, they invariably acquire a disagreeable flavor, and often become soft and greasy. The smoke should not be allowed to reach them until nearly or quite cool, and to effect this some farmers have the fire outside of the building, perhaps twenty or thirty feet distant, and conduct the smoke to the interior through a narrow covered trench. By its passage through the trench, it is cooled and purified, and there is no danger of its giving an unpleasant taste to the meat. A still better plan is practiced by the people of Westphalia, which, as all the world knows, is celebrated for its bacon. The smoking is performed in extensive chambers, in the uppermost stories of high buildings. Some are four or five stories above the ground, and the smoke is conveyed to them by tubes from pipes in the cellars. The vapor is condensed, and the heat absorbed by the tubes, so that the smoke is both dry and cool when it comes in contact with the meat. Many of the farm-houses in Pennsylvania have a somewhat similar arrangement. A room is partitioned off in the garret, next to the kitchen chimney, and the hams are hung from the rafters overhead. Near the floor is a small opening in the chimney, by which the smoke enters the apartment; and instead of returning to the flue, it finds its way into the open air through the innumerable crevices in the roof. The meat is thus kept perfectly dry, and it will be found to have a color and flavor unknown in that treated in the common method.

A smoke-house can hardly be too open; where the walls and roof are tight, or nearly so, the smoke condenses on the bacon, rendering it flabby and ill-colored. To be sure, when there is good ventilation it takes much longer to complete the process, but this delay we believe to be rather beneficial than otherwise. Some people have the fault of always being in a hurry, and their bacon is never well smoked. It should be cured gradually and slowly, and this is another reason why the Germans are so successful in the business. In Virginia, two months is not considered a long time for the operation.

Green sugar-maple chips are the best for the fire, and after maple are ranked hickory, sweet birch, and white ash or beech. Some think well-dried corn-cobs superior to everything else; and they certainly furnish a sweet, penetrating smoke. Saw-dust from hard wood is also excellent for the purpose, but rotten wood should never be used; and it is said that locust bark will actually spoil the flavor of hams; and we doubt not that there are many other substances which will produce the same result.

Some persons are always very particular about hanging their hams with the leg end down. They should never be allowed to touch each other, nor touch any flat substance. In hanging large numbers of hams in a crowded room, we have often kept them apart by a small piece of a corn-cob.

No farmery is complete without a smoke-house, and where the amount of meat to be annually smoked is insufficient to make it an object to erect a building specially for that purpose, it will be found very easy to set apart a small room in some of the outbuildings, and convey the smoke to it through a long flue. As the building mentioned in No. 349 never will be wanted for the purpose for which it was constructed, when bacon should be smoked, it could, perhaps, be made so as to answer both purposes.

349. **A Fruit-Drying House.**—In some sections remote from cities, and upon some farms, fruit-drying is quite an object, and is relied upon by the female portion of the family as a means of replenishing their wardrobe, independent of the general products of the farm. Upon fruit farms it is also made a considerable item of the regular business. All such farms should have a fruit-drying house, built upon scientific principles, to accomplish the object in the most expeditious manner, at the least expense. The true principle of drying fruit would be to place it on open-work hurdles, in the flue of a heated air furnace, so that there would be a continual draft of hot air passing through the fruit, carrying off the moisture into the upper air. The best one we ever saw, heated the air in the basement of a three-story building. In the third story, one side of the large brick flue was arranged like the drawers of a bureau, the bottom of the drawers being basket-work. In these, each of

which held about a bushel of apples or peaches cut in quarters, the fruit dried with wonderful rapidity. It needed no other attention than changing the drawers once from top to bottom, to equalize the drying, so as to finish all at once. Other things besides fruit were dried in this flue, such as sweet corn, okra, pease, tomatoes, etc.

The following, taken from the *Valley Farmer*, is the description of a drying-house in use in Wisconsin:

"It consists of a building of logs, brick, or stone, of any convenient size, say ten feet wide by twelve or fourteen long, and one story high, having an ordinary roof, with a ventilator to admit of the escape of the heat and vapor arising from the fruit.

"The furnace should open on the outside of the building, at the end. It should be about two feet square. The sides should be of brick, and as thin as may be to sustain the top. The flue should be extended to near the entire length of the building, and then return, forming a parallel flue, which may be reduced to two thirds the size of the furnace or main flue, terminating in a chimney near the door of the furnace. The top of the furnace and flue should be covered with plates of thin boiler iron; thicker iron, or a covering of brick or stone, will not admit of a sufficient escape of heat to facilitate the drying process. The fruit is dried on trays or hurdles, arranged in three tiers, one above another, with a space of twelve or fifteen inches between them. The hurdles may be two and a half feet wide, six or seven feet long, and three inches deep. These are made of common boards, with a lath bottom, made thin; the laths should be made of hickory, as the fruit is found to dry much more readily on hard wood lath than it does on poplar or other soft wood. Through the length of the building frames are put up to support the hurdles of fruit. These frames or rails extend through openings made in the end of the building opposite the furnace, and corresponding with each pair of rails are wooden shutters. The rails extend on the outside about six feet; upon these the hurdles are placed crosswise; upon each of the hurdles are rollers corresponding with the rails; being filled with the fruit to be dried, the hurdles are run in like cars upon a railroad. Thus arranged, with the three tiers of rails filled with trays of fruit, about one and a half barrels can be dried at once, requiring about twenty-four hours to complete the operation. The trays nearest the fire will, of course, dry the fastest, and, with the convenience of the railroad and the shutters in the end of the building, they may be drawn out and changed to the upper rails, when the whole may be finished within the twenty-four hours in the most perfect and uniform manner, and without the least burning. The fire should be made without grates, on the bottom of the furnace, which consumes less fuel, and keeps up a more uniform heat than if placed above the draft.

"In some instances we have seen pieces of old steam-boilers substituted in the place of brick walls for a furnace; to the boiler is connected and returned a pipe of somewhat smaller dimensions, a sheet-iron pipe, which admits of the free escape of heat and speedy drying of the fruit.

"The ordinary method of drying peaches and apples in Kentucky and Tennessee is to construct a kiln of stone, with a broad flat top, upon which the fruit is laid, and a fire kept up in the flue beneath till the fruit is sufficiently dried. This is more expeditious than drying in the sun, and the fruit is not so liable to be soiled by flies, yet it is objectionable on account of liability to burn the fruit in contact with the over-heated stone."

SECTION XIX.—ECONOMICAL FARM BUILDINGS, BALLOON FRAMES, CONCRETE WALLS, AND OTHER CHEAP STYLES OF BUILDING.

WE are satisfied that we can do those who desire to build no greater favor than making them acquainted with the modern style of building, known as "balloon frames"—a name that was at first conferred upon them in ridicule on account of their lightness and unsubstantiability. This name is only true as it applied to their lightness. Balloon frames are not ridiculous from any lack of sufficient strength. There is need of no stronger building than one made upon this plan, except where it is necessary to have strength of timber to sustain weighty storage or ponderous machinery. For all ordinary farm buildings, we earnestly recommend balloon frames. And we are not alone in our recommendations, though, so far as we know, we were the first in recommending them to farmers in the Eastern States. Of late, Geo. E. Woodward, an architect and builder of New York city, has written some exceedingly valuable articles upon this subject, and published them in the *Country Gentleman*, with illustrations, and to him or them we respectfully refer readers, who may be incited from what we say here, to make further inquiries.

Among the sensible things said by Mr. Woodward, are the following:

"Economy in the construction of all buildings adapted to the habitation or convenience of man has been a study of much interest to those who contemplate the erection of buildings for their own use or for the purposes of a profitable investment; though we are inclined to think experimental or inventive talent has applied itself more to produce some new and cheap building material than to develop the full resources of such materials as are found best adapted to our wants.

"Necessity has done much for the building public by introducing to their favorable notice the balloon style of framing wooden buildings—a style which is not well understood in the old settled and well-timbered portions of our country, but is, with few exceptions, the only plan adopted throughout the magnificent agricultural districts west of our great inland seas.

"The increasing value of lumber and labor must turn the attention of men of moderate means to those successful plans which have demonstrated economy in both, and at the same time preserved the full qualities of strength and security so generally accorded to the old fogy principles of framing, but which, we presume to say, is inferior in all the true requisites of cheap and substantial building.

"Any intelligent man who can lay out a right angle and adjust a plumb line may do his own building, for it is without a mortice, a tenon, or brace, and a man and boy can do all the work. This principle is the one applied to the construction of what are technically as well as sarcastically termed balloon frames, which, instead of proving a failure, stands with more than 30,000 examples of every conceivable size and form, a perfect success."

350. **How to build Balloon Frames.**—The following remarks upon the subject we printed some years ago, not only to show that much labor and much timber may be saved, but that sawed timber may be dispensed with where it is very expensive. We know that this article enabled many persons to build cheap frames, and as it once did good, we reprint it that it may do much more good in future. The remarks were an answer to the inquiry how to build balloon houses.

"I would saw all my timber for a frame house, or ordinary frame outbuilding, of the following dimensions: two inches by eight, two by four, two by one. I have sometimes built them, when I lived on the grand prairie of Indiana, many miles from saw-mills, nearly all of split and hewed stuff, making use of rails or round poles, reduced to straight lines and even thickness on two sides, for studs and rafters. But sawed stuff is easiest wrought, though in a timber country the other is far the cheapest. First, level your foundation, and lay down two of the two-by-eight pieces, flatwise, for side-sills. Upon these set the floor-sleepers on edge, 32 inches apart. Fasten one at each end, and, perhaps, one or two in the middle, if the building is large, with a wooden pin. These end-sleepers are the end sills. Now lay the floor, unless you design to have one that would be likely to be injured by the weather before you get the roof on. It is a great saving, though, of labor to begin at the bottom of a house and build up. In laying the floor first, you have no studs to cut and fit around, and can let your boards run out over the ends, just as it happens, and afterward saw them off smooth by the sill. Now set up a corner post, which is nothing but one of the two-by-four studs, fastening the bottom by four nails; make it plumb, and stay it each way. Set another at the other corner, and then mark off your door and window places, and set up the side-studs and put in the frames. Fill up with studs between, 16 inches apart, supporting the top by a line or strip of board from corner to corner, or staid studs between. Now cover that side with rough sheeting-boards, unless you intend to side up with clapboards on the studs, which I never would do, except for a small, common building. Make no calculation about the top of your studs; wait till you get to that hight. You may use them of any length, with broken or stub-shot ends, no matter. When you have this side boarded as high as you can reach, proceed to set up another. In the mean time, other workmen can be lathing the first side. When you have got the sides all up, fix upon the hight of your upper floor, and strike a line upon the studs for the under side of the joist, and cut a gain four inches wide, half-inch deep, and nail on firmly one of the inch strips. Upon these strips rest the chamber-floor joist. Cut a notch in the joist one inch deep in the lower edge, and lock it on the strip, and nail each joist to each stud. Now lay this floor and go on to build the upper story as you did the lower one, splicing on and lengthening out studs wherever needed, until you get high enough for the plate. Splice studs or joist by simply butting the ends together, and nailing strips on each side. Strike a line and saw off the top of the studs even upon each side of the building—not the ends—and nail on one of the inch strips. That is the plate. Cut the ends of the upper joist the bevel of the pitch of the roof, and nail them fast to the plate, placing the end ones inside the studs, which you will let run up promiscuously, to be cut off alongside of the rafter. Now lay the garret floor by all means before you put on the roof, and you will find that you have saved 50 per cent. of hard labor. The rafters, if supported so as not to be over ten feet long, will be strong enough of the two-by-four stuff. Bevel the ends and nail fast to the joist. Then there is no strain upon the sides by the weight of the roof, which may be covered with shingles or other materials, the cheapest being composition or cement roofs. To make one of this kind, take soft, spongy, thick paper, and tack it upon the boards in courses like shingles. Commence at the top with hot tar and saturate the paper, upon which sift fine gravel evenly, pressing it in while hot—that is, while tar and gravel are both hot. One coat will make a tight roof; two coats will make it more durable. Put up your partitions of stuff one by four, unless where you want to support the upper joist; then use stuff two by four, with strips nailed on top for the joist to rest upon, fastening altogether by nails wherever timbers touch. Thus you will have a frame without a tenon, or mortice, or brace, and yet it is far cheaper and incalculably stronger when finished than though it was composed of timbers ten inches square, with a thousand auger-holes and a hundred days' work with the chisel and adze, making holes and pins to fill them. To lay out and frame a building so that all its parts will come together, requires the skill of a master mechanic, and a host of men, and a deal of hard work to lift the great sticks of timber into position. To erect a balloon building requires about as much mechanical skill as it does to build a board fence. Any farmer who is handy with the saw, iron square, and hammer, with one of his boys or a common laborer to assist him, can go to work and put up a frame for an outbuilding, and finish it off with his own labor just as well as to hire a carpenter to score and hew great oak sticks and fill them full of mortices, all by the science of the 'square rule.' It is a waste of labor that we should all lend our aid to put a stop to. Besides, it will enable many a farmer to improve his place with new buildings, who, though he has long needed them, has shuddered at the thought of cutting down half of the best trees in his wood-lot, and then giving half a year's work to hauling it home and paying for what I do know is the wholly useless labor of framing. If it had not been for the knowledge of balloon frames, Chicago and San Francisco could never have arisen, as they did, from little villages to great cities in a single year. It is not alone city buildings, which are supported by one another, that may be thus erected, but those upon the open prairie, where the wind has a sweep from Mackinaw to the Mississippi—for there they are built—and stand as firm as any of the old frames of New England, with posts and beams sixteen inches square."

To this we add something more from Mr. Woodward. He says:

"We hear and read very much about the policy of cutting mortices, tenons, gains, etc., in the various pieces which go to make up the balloon frame. Now it is our opinion, based upon a long and thoroughly practical experience, that he who does much of this will have some misspent time to account for hereafter, besides weakening his building and hastening the decay of the frame. A gain must be cut in the studding for the side girt, unless the dwelling be lined. Gains are sometimes cut in floor joists for the purpose of locking them over partitions that run through the hight of the building. Rafters projecting over the sides should be notched, to give them a foothold on the plate. These causes would, as a general thing, constitute all the cutting necessary.

"In building houses one-and-a-half-story high, never cut a gain for the side girt on which to rest the upper-story floor joists, unless the thrust of the roof be well guarded against by secure collar beams. We prefer, when we cut this gain, to use studding one inch wider for the sides. Where the building is lined, the side girt rests on top of the lining, and no cutting is necessary.

"Unplastered buildings, of a moderate size, are sufficiently strong if the girt be nailed directly to the studding without cutting the gain or recess.

"We have recommended, in the construction of a barn 24 by 40, alternate studs on the sides, 2 by 4 and 2 by 5, the side girt to be nailed to the narrow stud and let one inch into the wide stud. This would not answer for a plastered building, as the surface is not flush for lathing.

"Two full story buildings are abundantly strong with 2 by 4 studding and gains cut into them for side girt; the third floor ties the top of the studding, so there is no yield. The joists of the third floor should be placed upon the plate, the ends beveled to the same pitch of the rafters, and each joist nailed at both ends to each rafter.

"We prefer to build the second story full for a dwelling-house, as we get more strength, more convenient room, and the real difference in expense is practically nothing. Where the studding is more than five feet high above the second floor of a barn, two or three tie-strips across the foot of the rafters will make all snug. There should be tie or collar beams on all rafters.

"In story-and-a-half buildings, it is very desirable that collars be put on securely, so as to prevent any thrust of the rafters; where the side girt is not gained in, as in small unplastered buildings, the collars may be nailed or spiked to the rafter. If the side girt is set into the studding, as it should be in a plastered building not lined inside, it makes a weak point in the studding, reducing them from 2 by 4 to 2 by 3, and the collars should be put on in such a manner as to guard against any thrust whatever. The size of the building and the judgment of its constructor will indicate the best course to pursue. Buildings of one, two, or more full stories have no collars; the joists of the upper floor tie the top of the building, and take the thrust of the rafters. In the usual mode of inside lining, one side laps the stud. The ends of the lining of the adjoining side are nailed to a strip fastened to the stud to receive them.

"We have built balloon frames with green oak studding, basswood siding, and butternut trimmings, that have never yielded. There is a system of compensation among the light sticks of a balloon frame by which the seasoning process goes on without injury to it. We have seen warped surfaces produced by using green oak siding and by careless building, but there is no good reason why a balloon-frame building should not be always square and plumb, and the outside boarding remain secure.

"The subject of tapering rafters has been pretty thoroughly discussed heretofore. The same amount of strength can be had with a less amount of lumber. There is an additional labor in sawing such rafters, as well as a different calculation to be made in using up a log to the best advantage. It is necessary always to order this special bill of rafters direct from the mill, and the result will be that the extra cost will, nine times out of ten, overbalance the amount saved."

351. **The Cost of the Author's Balloon House and Barn.**—There is not only a saving in first cost of lumber, but a very large item will be saved in the bill of carriage, particularly where it has to be hauled a long distance on a wagon. The saving in the carpenter's bill is very large, because so much of the work may be done by persons less skillful than a well-bred carpenter. And then there is a total saving of all that troublesome, dangerous, hard work attendant upon an old-fashioned "raising."

We have lately built (that is, we were our own architect) a house and barn, a few miles out of the city of New York, upon the plan we are advocating, and therefore can speak from actual experience of the benefits of the plan in an old as well as in a new country. The house, or rather the addition to an old one, is 18 by 24 feet, with an attachment eight feet square upon one side, and a piazza six feet wide on the other. It is one story of $10\frac{1}{2}$ feet, and has nine windows and seven doors. Both floors are deadened by a course of boards and heavy coat of clay mortar. The siding is nailed upon studs 2 by 4 inches, and there are two courses of lath and plastering—one half way between the siding and inside lath. The roof projects, and is ornamented, and the garret is lathed and plastered, and the lower part divided into four rooms, and all is of good materials and workmanship, at a total cost, except painting and papering, of $450. The sills and sleepers are pine, 3 by 7, and the joist 3 by 6, spruce, and all would have been just as good, if procurable, 2 by 6 inches; and there is not an upright stick larger than 2 by 4 of hemlock. This house, notwithstanding its cheapness, is strong, durable, warm, and good-looking. What more could we have of a ponderous, expensive frame?

Our horse barn is 22 by 24 feet, and 13 feet high, and has but one upright stick in it larger than 2 by 4 inches. As the hay-loft is a high half story, it was thought best to have a center-post, which is 3 by 7, to support the ridge pole in the middle. The studs are covered with smooth pine siding, and the lower story is lined with rough boards, and the building is as strong as we desire, and cost, completely finished, with good floors, stalls, mangers, doors, and windows, $300. The carpenter's work was only $50.

We have dwelt more fully upon this subject of balloon frames than upon many others, because we look upon it as one of very great importance. It is one that, if fully understood, would induce and enable farmers to have better dwellings and other farm buildings.

352. **Concrete Walls.**—The best advice that we can give one who asks for information about making concrete walls, or how to build houses of gravel, or broken stones and lime and sand, is that he buy a little book called a "Home for All," published by Fowler & Wells, which gives all the details of this mode of building. Mr. Fowler directs mixing a large mortar-bed of lime and sand together, with twice as much sand as slacked lime, made quite thin, and well worked. Into this mixture of lime and sand and water the gravel or broken stone is put and evenly mixed, and then shoveled out into a barrow or hoisting tub, and from that dumped into a smaller mortar-bed on the scaffold, where it gets another good mixing, and wetting if needed, and is then shoveled into the box that forms the mold to give shape to the walls. In this mold it hardens in one day so that the mold can be removed, but it takes a longer time to dry hard enough to put on the next course. Such walls, if well made, are almost as solid as hewn stone, and much cheaper where lime is not costly, and where sand and gravel or broken stone can be had for hauling.

The proportion of materials given in the book referred to for a concrete wall are eight wheelbarrows full of lime, mixed with sixteen barrows of sand into a thin mortar, to which add sixty or eighty barrows of pebbles or rubble-stone. The lime may be of the coarsest kind, and not over one bushel of stone lime to thirty bushels of sand and stones. A wall three stories high is recommended—twelve inches thick for the first, ten inches for the second, and eight inches for the third. To protect the outside plastering, the roof should be a projecting one.

We do not know how far this plan of building can be recommended upon the score of economy. We think that will depend very much upon circumstances. If broken stone or pebbles are very convenient to the building site, and lime to be had for the burning on the place, or at a small cost, the building will be a cheap one, and not otherwise. Horace Greeley built a large barn of concrete upon his farm in Westchester County, of such stones as are spread over the surface of these granitic hills. Although it is a very substantial building, our opinion is that we could build a good frame, and put the surplus money into other improvements, to a better profit.

353. **Building with Billets of Wood.**—A new style of building has been adopted in several places at the West, where brick and stones are inconvenient, and sawed lumber and carpenter's work are expensive. The plan is to saw billets of wood of an even length, say one foot long, from limbs of trees; or split stuff; slabs, we suppose, would answer a good purpose, if split up into fire-wood size. These billets must be straight enough to pile up well. The wall is made by laying them in lime mortar, and, we believe, in some cases, in good clay mortar, where lime and sand are scarce, and then plastering the wall outside and in. The great objection seems to be that the outside plastering cleaves off, as it does from all plastered buildings exposed to rain, frost, and heat. A friend writes us inquiring whether there is any composition for outside plaster that will stand the weather. We answer, none that can be wholly depended upon. A mortar made of hydraulic cement (water lime), of good quality, mixed with clean, coarse, sharp sand—two parts of sand to one of cement—would stand until some crack occurred, and water and frost get in behind. Perhaps the mortar described in No. 359 will answer the purpose. But as it is cheaper, and perhaps equally good, we would recommend an ordinary coat of plaster, and then take cement and any cheap oil, and mix a pretty thick paint, and put on thoroughly two or three coats. Another good paint may be made as follows: Take four pounds of rosin and one pint of linseed oil, and boil together, adding about an ounce of red lead, and put it on hot, and afterward paint any color you like. If a crack ever occurs, stop it at once with the rosin and oil mixture. We have no doubt that these billets-of-wood houses can be built in many places cheaper than any other, and that they can be made neat, comfortable, and durable.

SECTION XX.—ROOFS AND ROOFING—PAINTS AND WHITEWASH FOR FARM BUILDINGS—NAILS AND MORTAR—FARM GATES.

WHATEVER the style of building adopted for any of the farmery structures, a good roof never should be lost sight of, for upon that, much of the farm economy depends. A leaky roof on a dwelling destroys comfort and property, and is the source of many unpleasant days and nights to the family, and sometimes productive of sickness, as well as injury to furniture. A leaky roof upon a barn will destroy every year a greater value of hay and grain than it would cost to make it tight. It is for this that we give special attention to this part of the farm buildings. We also give some valuable hints upon painting and whitewashing, because both beauty and economy may be thus promoted.

354. **Sawed Shingles.**—Of all the inventions ever contrived, that of sawed shingles has proved to be one of the least value to the country. The only profit is to the patentee and manufacturer. To every one who has used them, sawed shingles have proved a loss, no matter what the saving has been in first cost, unless the shingles, previous to laying on the roof, were prepared so as to prevent their saturation with water every time the rain fell upon them. It is this repeated saturation of sawed shingles that rots them, and gives us leaky roofs in one fourth the time that split shingles remain sound. It is true that good shingle timber is becoming scarce, and more and more so every year, and that farmers must have something as a substitute. What that something is we know not, but are quite sure, where economy is studied, that it will not be sawed shingles. If they must be used, let the roof have a very steep pitch. On a flat roof we have known them rot entirely through in five years. Another roof, ten years old, both shingles and roof-boards, when taken off, crumbled into a mass of rotten wood, that scarcely bore any resemblance to boards and shingles.

"A retired mechanic" writes us that he followed building eighteen years, and prefers sawed shingles if they are planed on the upper side, and says that a smart hand can plane from two to three thousand a day. We think a machine might be constructed to plane one side of sawed shingles without adding much to the cost. Without planing or dipping in boiling oil or tar, we do not believe sawed shingles should ever be used by any one who wants a good roof, or who cares for economy. The writer of a letter now before us speaks in very severe terms of the manufacturers of sawed shingles. He says they are often made of small cross-grained, sapling spruce, and that the bark of the tree will last about as long as such shingles on a roof. The carelessness of persons employed to lay shingles is notorious, and a cross-grained shingle is just as apt to be laid wrong side up as right. Then the surface wears rough, and water soaks into the wood and rots it through so as to leak in a few months. This writer thinks the fault of sawed shingles is much more in the timber than in the manufacture; that is, that sawed shingles from good, sound, straight-grained timber will last as long as split ones.

Another letter writer suggests that sawed shingles should never be laid upon a boarded roof, but upon narrow laths, one to each course. He says:

"I know of a building where the shingles were put on boards and the boards put close together, which have been on but a few years and are very leaky; the shingles and boards have rotted through in places, while other parts are sound and good. I think the reason is, the shingles lie so close to the boards that when they get wet they never dry through; while if laid upon laths, sawed shingles will last as long as split ones from the same timber."

Another writer, speaking of the absolute necessity of using something as a substitute for split shingles on account of the scarcity of timber, wants to know why we can not have tile manufactured that will be a better substitute for shingles than anything else that we have, both for economy and certainty of having a good roof.

A correspondent speaks of shingles cut by a machine patented by J. L. Brown, of Indianapolis, Ind., at the rate of 50,000 a day, that are altogether superior to sawed shingles, even should the latter be planed. This may be so, but we have no faith in the economy of using shingles made by any kind of machinery that cuts wood across the grain. No shingles thus made will be as durable as split ones, unless saturated with oils or resins, or kyanized, and then they would be as expensive as those made by riving and shaving, or perhaps as much so in the long run as slate or tin. Depend upon it, using poor shingles upon farm buildings is very poor economy.

355. **Preserving Shingles on Roofs.**—"Some paint roof shingles after they are laid. This makes them rot sooner than they otherwise would. Some paint the courses as they are laid; this is a great preservative if each shingle is painted its full length, and not by courses."

Mr. Ed. Emerson, of Hollis, Mass., thus gives, in the *New England Farmer*, some hints that are worthy of preservation upon shingling roofs. He says:

"Twenty-three years ago I had quite a lot of refuse shingles on hand, both sappy and shaky, and I laid them on the back kitchen and wood-shed. I have just examined them, and think they will last at least seven years longer. The building has not leaked, to my knowledge. I soaked these shingles in a very thin whitewash, made with brine instead of clear water. There has been nothing done to them since, although I have no doubt that to have whitewashed or served a coat of dry-slaked lime or fine salt once in two or three years on them, would have been of great advantage to them.

"As I shingle differently from almost every one else, I will give you my method, and my reasons for it. However wide the shingles may be, I do not allow the nails to be put more than two inches apart. *Reason*—If your shingles are wet or green, and the wide ones are nailed at the edges, the shingles must split or one of the nails must draw when the shingle shrinks. If the shingle is dry, it must huff or crowd the nail out when it swells. Thus your nails are kept in constant motion by every shrink or swell of the shingle till they are broken, pulled out, or the shingle is split. I do not want the nails driven quite in, or so as to sink the head. *Reason*—The heads of the nails hold up the butts of the next row of shingles, and give the air a free circulation.

"I lay all my shingles in whitewash. I prefer brine for making it. I line with red chalk. I then whitewash the last course laid down to the line, and after the building is shingled I whitewash the whole of the roof. *Reason*—To make the shingles last twice as long as they would without the whitewash, and I consider it much better than just whitewashing the roof after shingling."

"Whitewashed shingles are never mossy. If slaked lime is sprinkled upon wet roofs, it will prevent moss from growing, and if the shingles are covered ever so thick with moss, putting the lime on twice will take all the moss off and leave the roof white and clean, and it will look almost as well as if it had been painted. It ought to be done once a year, and, in my opinion, the shingles will last almost twice as long as they will to let the roof all grow over to moss." One who has tried this plan says:

"I tried it on the back part of my house ten years ago, when the shingles were all covered over with moss, and appeared to be nearly rotten. I then gave the roof a heavy coat of lime, and have followed it nearly every year since, and the roof is better now than at first."

356. **Roofs—their Form—Shingled and Composition.**—It is a serious defect in our roof architecture that the roofs of most buildings are so flat that the rain finds its way under the shingles. Sharp roofs keep out rain and last longer, and although the first cost is a trifle greater, they are cheaper in the end. We know of no composition we can recommend to cure leaky shingled roofs, though several are advertised as sure cures. We are afraid they are like the Indian's gun—"cost more than he worth." There is a patent asphalt roofing felt that can be easily put on by any person. It weighs only about forty-two pounds to the square one hundred feet. It must be stretched tight and smooth, overlapping full one inch at the joinings, and closely nailed through the overlap. It should then receive a coating of coal-tar and lime—two gallons of the former to six pounds of the latter—well boiled together and kept constantly stirred while boiling, and put on with a swab, and while it is soft some coarse sand may be sifted over it. This coating needs renewing once in five or six years.

There is also roofing-paper—a soft, spongy substance, saturated with tar, which comes in rolls, and is sold for about four cents a pound. It is unrolled upon a flat boarded roof, and tacked sufficiently to hold it in place, and then saturated with tar, which glues it to the boards, and it is covered with sand; then more tar and another coat of sand.

Another receipt for composition roofs is given as follows: Take coal-tar, 300 pounds; hydraulic lime, 150 pounds; ocher, 75 pounds; and whiting, 40 pounds. Mix these substances together thoroughly, and they will make a sufficient quantity of cement to cover 1,000 square feet of roofing. It should be laid down upon strong cotton sheeting nailed to the roof-boards, and on the top of all a coat of dry sand or gravel is to be laid and pressed firmly down. The cost of such roofing is about $2 30 per ten square feet. It answers very well for sheds and other outhouses.

357. **Protecting Roofs from Fire.**—In a country where wood is used as fuel, and where roofs are made of pine shingles, and where droughts are among the things occurring every summer, there is constant danger of conflagration of the dwelling from sparks on the roof. This may be guarded against in a very great measure in a very inexpensive manner. A roof carefully washed with three coats of either composition mentioned in Nos. 360 or 361, once in three years, would be a hundred times less liable to take fire from sparks than an unwashed roof.

Such a wash would be a very cheap preventive of danger from fire. So is the paint mentioned in the following extract:

"A wash composed of lime, salt, and fine sand or wood ashes, put on in the ordinary way of whitewashing, renders the roof fifty-fold more safe against taking fire from falling cinders or otherwise, in cases of fire in the vicinity. It pays the expense a hundred-fold in its preserving influence against the effect of the weather. The older and more weather-beaten the shingles, the more benefit derived. Such shingles generally become more or less warped, rough, and cracked; the application of the wash, by wetting the upper surface, restores them at once to their original form, thereby closing the space between the shingles, and the lime and sand, by filling up the cracks and pores in the shingle itself, prevent its warping for years."

358. **Cheap Nails.**—The cheapest nails are not the lowest priced ones. Cut nails, made of iron of good quality, will outlast such as can be bought at the lowest rates about two to one. Never use nails for siding or shingles that break very easily; and be sure not to allow your carpenter to use nails of very light weight. First-rate cut nails of suitable size may cost twenty-five per cent. more than the poorest and lightest, but in the end they are a hundred per cent. the best. Nails made of poor iron will rust out a great deal quicker than nails made of good tough malleable iron, like that known as old sable. It is about on a par with sawed shingles to use the cheapest or lowest priced nails, particularly for shingling. In building balloon frames none but the very best quality of nails should be used. Those known as "fence nails" are far the best, being made of thicker iron than the ordinary nails of the same number.

Weather-Proof Nails—are described in the *Ohio Cultivator*. It says:

"Everybody knows what a difficult thing it is to nail roof-boards and weather-boards so that they will hold for a good length of time. There are many other places in which it is nearly impossible to make nails do the office for which they are intended. A remedy—and the only one I ever saw—I discovered a few years ago; it is very simple and never fails. Take tenpenny, malleable nails, and place the head in a vice, and with a pair of pincers grip the nail near the point, and twist it half-way round, minding to make the twist somewhat elongated. In driving, the nail becomes a screw, and neither sun nor hammer can withdraw it."

359. **To make Mortar Impervious to Wet.**—"Provide a square wooden trough, say 8 by 4 feet, and 2 feet deep; put in a quantity of fresh lump lime, and add water quickly. When the lime is well boiled, having assisted that operation by frequent stirring, add tar (the heat of boiling lime melts the tar), stir it well, taking care that every part of the lime is intimately mixed with the tar; then add sharp sand or crushed clinker, and stir it well as before; after which, in about twenty hours, it will be fit for use."

360. **Cheap Paints for Farm Buildings.**—Tar and lime may be used, in order to make either wood or mason-work waterproof. The best way to prepare gas or coal tar for coating wood-work with, is to get some of the best stone lime, avoiding chalk lime, and slake it to a fine powder; boil the tar for about half an hour, and then add about one pint of hot lime-powder to a gallon of tar, and boil it about half an hour longer, stirring it continually, and using it hot.

We give the above as we find it, but prefer the following: Take the common "Rosendale cement" (water lime), sift it, and mix the fine powder with coal-tar, or any kind of oil, and it will make an excellent paint, of a drab or brown-stone color.

361. **Permanent Whitewash Paint.**—Another excellent paint is made of the following ingredients: that is, one bushel of well-burnt white lime unslaked, 20 lbs. Spanish whiting, 17 lbs. rock-salt, 12 lbs. brown sugar. Slake the lime, and sift out any lumps or stones, and mix it into a good whitewash, say with 40 gallons of water, and then add the other ingredients, and stir all well together, and put on two or three thin coats with a common whitewash brush. Five dollars' worth of this cheap white paint will give the farmery such an improved appearance that it would sell readily for $100 more than it would in its old wood-colored coat and neglected-looking condition. This mixture makes a paint that is very cheap, and makes a coat that does not wash off or rub off, and looks well—that is, makes the rough boards of a barn, shed, outbuilding, or fence look much better than in their natural wood-colored condition; and it will, by its antiseptic qualities, tend beneficially toward the preservation of the wood. It can be tinted by any of the articles mentioned in 362. This is intended for the outside of buildings, or where it is exposed to the weather. In order to give a good color, three coats are necessary on brick and two on wood.

Another cheap and good paint may be made of any pure clay; such as potters use is the right sort; or that known as "blue clay" will answer a good purpose in its natural condition. Even such as brick-makers use can be washed of all its impurities, by thoroughly mixing it with a large bulk of water, and letting it settle and then draw off the water, and also reject the bottom of the mass, which will contain all the sand.

To prepare clay for paint, first dry it, either in the sun or by fire, and then pulverize it fine, which may be done with a cannon-ball in a swinging iron pot. Then sift it, and mix with boiled linseed oil, pretty thick, and you will have just as good a fire-proof paint, or a weather-protecting paint, as any that are sold as such in the shops.

In some localities soft slate, or slate-dust from a manufactory, can be had, and that will make a good "mineral paint."

362. **Zinc and Lime Whitewash Paint.**—Take a clean barrel that will hold water. Put into it half a barrel of quicklime, and slake it by pouring over it boiling water sufficient to cover it four or five inches deep, and stirring it until slaked. When quite slaked, dissolve it in water, and add two pounds of sulphate of zinc and one of common salt, which in a few days will cause the whitewash to harden on the wood-work. Add sufficient water to bring it to the consistency of thick whitewash.

To make the above wash of a pleasant cream color, add three pounds of yellow ocher.

For fawn color, add four pounds of umber, one pound of Indian red, and one pound of lampblack.

For gray or stone color, add four pounds of raw umber and two pounds of lampblack.

The color may be put on with a common whitewash brush, and will be found much more durable than common whitewash.

363. **Stucco Whitewash.**—To make a brilliant stucco whitewash for all buildings, inside and out, take a bushel of clean lumps of well-burnt lime, slaked; add one fourth pound of whiting or burnt alum pulverized, one pound of loaf sugar, three quarts of rye flour, made into a thin and well-boiled paste, and one pound of the cleanest glue, dissolved. This may be put on cold within doors, but should be applied hot outside.

The following is another receipt for stucco whitewash: Take half a bushel of nice unslaked lime, slake it with boiling water, covering 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 water; three pounds ground rice, boiled to a thin paste, and stirred in boiling hot; half a pound Spanish whiting, and a pound of clean glue, which has been previously dissolved by soaking it first, and then hanging over a slow fire, in a small kettle inside 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 quite hot; for this purpose it can be kept in a kettle on a furnace. It is said that about a pint of this mixture will cover a yard square of the outside of a house, if properly applied.

The size of the brushes used should be adapted to the work required. This composition answers as well as oil paint on wood or stone, and is cheaper. It retains its brilliancy for many years.

Coloring may be put in, and made of any shade you like. Spanish brown stirred in will make red pink, more or less deep to the quantity. A delicate tinge of this is very pretty for inside walls. Finely pulverized common clay, well mixed with Spanish brown, makes a reddish stone color. Yellow ocher stirred in makes yellow wash, but chrome goes further, and makes a color generally esteemed prettier. In all these cases the darkness of the shades is determined of course by the quantity of coloring used. It is difficult to make rules, because tastes are different; it would be best to try experiments on a shingle, and let it dry. We have been told that green must not be mixed with lime. The lime destroys the color, and the color has an effect on the whitewash, which makes it crack and peel. When walls have been badly smoked, and you wish to have them a clean white, it is well to squeeze indigo plentifully through a bag into the water you use, before it is stirred into the mixture. If a larger quantity than five gallons be wanted, the same proportion should be observed.

The above is the receipt that has been so long in circulation as that which gave the original whiteness to the "White House" at Washington.

In oil painting, never suffer a painter to use unboiled oil upon any of your buildings or farm implements, and certainly never suffer yourself to leave any of them unpainted. Take care that the painter is not too liberal in the use of his "driers" in your paint. Tint is to please the eye. Oil preserves the wood, and one coat of boiled oil is worth three of unboiled.

All farm buildings should be oil-painted or whitewashed. Whitewash tends to preserve wooden buildings more than any ordinary coat of paint, particularly such a one as would be given to unplaned boards, which is a better condition for whitewashing than when smooth. The ice-house should be whitewashed on the outside as often as it is necessary to keep it perfectly white, as that is an important aid toward keeping it cool.

364. **Farmery Gates.**—No farmery can be considered at all complete that is not amply furnished with gates, constructed with particular adaptation to their several situations, and arranged in the most perfect manner with hinges, latches, and fastenings. There is to us no greater evidence of a slovenly farmer than is furnished by half-dilapidated, or at best inconvenient, bars. These bar-ways may answer in field fences, where they are seldom to be opened, but they are a nuisance about the farmery. Most of the farmery gates should be self-closing, and made to swing so that an animal could not push against and open the gate. In some places a gate can not be made to swing either way; then it must be made to open upon some one of the several plans that have been made for convenient opening in a straight line. One of the sort patented by some one in Oneida County, N. Y., is a very easy working gate. It is made of very light stuff, and for a wagon-way a pair, each five feet long, are set between posts nine feet

apart, and held against the posts by guides, which allow of their easy working. Attached by bolts to the upper outward corner are two light strips of boards, one on each side, and two others in the center. These strips are hinged to posts at the bottom in the same way they are at the top to the gate, and when the gate is shut they stand at an angle with the gate like braces, and when the gate is to be opened it lifts upon these centers, and passes over and stands alongside of the fence in a straight line. Such gates are very convenient in case of snow, as they lift up right out of the drift, so as to allow a passage without shoveling. When closed, the two gates are fastened together by hooks or bolts, or any convenient fastening. As they are not hinged to the posts, these may be made quite light.

Another plan of a gate, to open without swinging, is to suspend it upon rollers running upon a rail overhead. Some one has improved upon this plan to make the gate openable by a person driving up in a wagon. This is done by lifting the gate at the front end by a lever, which changes the level of the railway-bar upon which the gate hangs, so that it rolls back by its own gravity. The principle will be understood by looking at any gate made to run off on rollers upon a bar above the top, by supposing one end of the bar raised, when the gate rolls down. A touch of another lever, as the wagon passes, reverses the position of the bar, and the gate rolls back again to its closed position.

The great objection to this, and almost all the plans for opening gates from the wagon, without alighting, is the unsightly appearance of the gallows-frame necessary to support the levers, ropes, and pulleys.

We have seen gates which opened by the weight of the wagon passing over a bar, and shutting it by another touch of a bar on the other side. There is a good deal of machinery to this plan, as well as to nearly all of the contrivances to open and shut gates without labor, and the most of them are very liable to fail of working easily.

The most simple one of the kind, and, so far as we could judge from a single examination, the least liable to get out of working order, was one exhibited at the New York State Fair of 1860 by Jasper Johnson, of Genesee County. One of the greatest advantages of this invention is, that it can be applied to gates already in use, so that one can be opened by a person in a wagon and shut as he passes through without stopping.

Any erection that will sustain a single cord upon each side, and a bar of iron about four feet long, of the size of an ordinary crowbar, and one or two small rods, comprises all that need be added to any gate to fix it for this convenient way of opening. This bar of iron is made in a peculiar form, and attached to the gate-post by a loose joint at one end, while the other works in a long staple attached to the gate. Its position is moved by pulling the cord, and its specific gravity being thus changed, throws the gate open, and shuts it by another pull at the same cord, or the other one, as the person drives through. The attachment certainly is a very cheap one, and its operation was entirely satisfactory.

Robinson's Farm Gate is the name given to one invented, and not patented, by Dr. D. A. Robinson, Union Springs, N. Y., of which we think pretty highly. One of its good points is the cheapness of the hinges. These are figured and fully described in that excellent pocket manual, the "Rural Register," published by Luther Tucker, from which we copy the following description:

"This gate may be made of any light, tough, and durable wood, but answers a good purpose when made of pine, with the upright or cross-bars of white oak. The upper horizontal bar is 11 feet long, 3 inches wide horizontally, and 5 inches deep at the hinge, and $2\frac{1}{2}$ at the latch. The mortises are only two thirds through, to shut out rain, and $\frac{5}{8}$ by 3 inches—except in the heel-piece they are an inch and quarter. The heel-piece is 3 by 5 inches, and the four lower bars are boards 1 by 5 inches. The cross-bars, the brace, and the two pieces forming the head-piece are 1 by 3 inches. They are secured at each crossing by wrought or annealed nails. The head-piece consists merely of two boards, nailed on each side of the horizontal boards. The hinge is made by driving an iron rod, at least three fourths of an inch in diameter, into the top of the post, which turns in a hole seven eighths of an inch, bored two thirds of the distance through the large end of the upper bar. A short iron plug driven into this hole makes a hard resting point that will not wear, for the gate to turn upon. The lower hinge is a wooden block, attached to the lower part of the gate, and hollowed out so as to fit upon the round post. The latch is not attached to the gate, but to the post, so that it catches over the top rail, which is made to project beyond the end of the gate for that purpose. If it is preferred to have the latch fastened on the gate lower down, a pin can be fixed in or one of the slats projected forward. This gate is not liable to sag much, *because there is no weight whatever straining the hinges, except while the gate is open.* A pin or spike is driven into the post on which the hinges turn, just above the lower hinge, to prevent hogs or other animals from lifting the gate, but which does not prevent it from being placed on its hinges while open. The post holding the latch may be rough, except the face, and the other need be rounded only where the hinge turns.

"The whole cost of the hinges need not exceed ten cents, and the gate itself may be made at no greater expense than a common set of bars."

An excellent gate-fastening is one in common use in Mississippi and some other Southern States, which we have never seen in any of the Northern ones. A gain is cut in the corner of the post, say three by four inches, and in that is hung a piece of flat bar iron, say one inch wide and one fourth of an inch thick, bent in somewhat the form and of the length of half a horse-shoe, the upper end hammered thin and bent over a staple which is driven in the upper part of the gain, so that the lower end of the bar rests on the bottom, near the outer edge. An iron pin in the upright of the gate strikes against this little bar and lifts it up and passes beyond the end of it, when it falls back, and no power but a man's hand can open the gate—but for that it is very easy. It is one of the best latches we ever saw to prevent unruly animals from getting the gate open, and it is very cheaply made, and would be a very safe one for all the gates about the farmery liable to be opened by the hogs and cattle.

The following is a good plan of a new gate-hinge or plan of fastening the upper hook or eye of a gate-hinge into the post, which we have seen described lately, and like it so much that we wish all farmers to know it. Instead of driving the hook into the post, a hole is bored quite through it just at the top of the upper rail of the fence, and the shank is made long enough to reach some inches beyond the post, and has several notches on its upper side. Bore a hole through the rail and put a small bolt with a loophole at one end, to bite into a notch of the hinge, and nut at the other. Of course, when screwed up, the sag of the gate can not draw the hook; but if necessary it can be made shorter by shifting a notch or two.

The following dimensions of a good strong farm gate, and the timber for it, may be taken as pretty near correct:

Space between posts, 12 feet; hight of posts above ground, $5\frac{1}{2}$ feet; slats, 12 feet long, 5 inches wide, $1\frac{1}{4}$ inches thick for the bottom one, and 3 inches wide for the other six; hight of gate, $4\frac{1}{2}$ feet. The ends into which the slats are tenoned are $2\frac{1}{2}$ by 3 inches, 5 feet long. Some prefer to have the top rail double the strength of the middle slats. There are two braces and a center upright fastened with small screw bolts or rivets. If a strap hinge is used, they should be riveted to the slats. If straps are not used, the iron should be made to clasp the upright, and not go through it.

In soft land, like that of the Western prairies, it is difficult to make gate-posts stand firm, and they are often formed with a gallows-looking cross-bar overhead.

A better way is to put this cross-bar and braces at the bottom. Frame the posts and braces into a sill, and bury that three feet deep, and it will effectually prevent the posts from sagging, and then you may use them of much smaller timber.

A good light gate is made as follows: Take strips of boards three inches wide, half an inch thick, of any strong wood; pine, free of knots and weak spots, will answer, and cut them suitable lengths for the length, and others for the width of the gate. Lay down upon a smooth surface several of the short strips not over three feet apart, and then lay the long strips on for a close gate three inches apart at the bottom, gradually widening to the top; then lay down short strips directly over the others, and nail through these with clinch nails. We have sometimes reversed the order, and used two long strips opposite, instead of two short ones, which makes a stronger but heavier gate. Small gates made either way are quite strong enough. The hinges should be of a peculiar form, with long straps to clasp the gate so as to rivet through and hold the wood between the iron.

In Section LII., in an article upon farm fences, something will be found about how to make gate and fence posts durable.

SECTION XXI.—LIGHTNING CONDUCTORS—PROTECTION OF FARM BUILDINGS FROM FIRE.

IT is a great question for the owner of farm buildings whether he can protect them from destruction by lightning-rods. Being almost faithless ourselves, yet not quite sure that lightning-rods are all useless, we will give the opinions of several who have investigated the question.

365. **Opinions of the Value of Lightning Conductors.**—Mr. Quinby, a practical electrician, gave the following view of the subject in an article in the *Working Farmer:*

"There can be few subjects of equal importance less generally understood, or perhaps more universally misunderstood, than the science of electricity in its application to lightning-rods. The errors of the past are very slow of eradication, although it must be admitted that progress has been made since the famous discussion in George III.'s time as to whether lightning-rods should be pointed or blunt at the top. So little is known of electricity itself, and so largely is it a purely speculative science, that it is no wonder that doctors disagree.

"It is clear that the most valuable opinion on this subject is to be looked for from those who have made the study of electricity and thunder-storms a specialty, with the practical result in view of ascertaining the most effectual means of protection, and it is to be remarked that those who have done this have arrived at similar conclusions.

"It is a common error to suppose that lightning-rods should be insulated, and a very natural one, arising from a superficial view of the subject. It should be remembered that currents of electricity in a rarefied state are continually circulating through masses of matter silently and without producing any manifest effects; the effect of insulation is to interrupt the flow of these currents, whereas the lightning-rod ought rather to be so contrived as to facilitate their free passage from the building to the rod, and thence to the atmosphere, and *vice versa.*

"During that disturbed, electrified condition of the atmosphere, which we call a thunder-storm, these currents circulate in greater volume and rapidity, and a sufficient interruption of them brings about a discharge of lightning.

"At such times the insulation of the rod from the building is a most excellent device for causing an explosion of accumulated electricity either from or into the building, as the case may be. The rod, on the contrary, ought to act somewhat as a safety-valve, as regards any electrical disturbance within the house, neutralizing it gradually, and thus preventing an explosion.

"Should the rod be struck by lightning, its efficacy in carrying off the shock will depend on whether it presents a continuous chain of conducting matter, in the line or direction of the discharge, which is superior to anything within the building. If it does not, all the glass in the world will not prevent fluid from leaving the rod and passing through the building on such conductors as it may find there.

"The true theory or purposes of the lightning-rod is to facilitate electricity in following out its natural laws and tendencies, and nothing can be more truly unscientific or practically absurd than the idea of presenting a barrier or obstruction to lightning."

This theory fully accords with all our information upon this subject.

The following are the views of another practical electrician, S. D. Cushman, of South Bend, Ind. He says:

"A conductor for the protection of life and property from the effects of lightning should be so constructed and applied that it will add to the conducting power of the building so as to admit of the most intense discharge being securely transmitted, without explosion or damage to the building or structure.

"ATTRACTION.—The utility of a lightning-rod does not consist in its attracting power.

"INSULATION.—The conducting power of a lightning-rod is frequently diminished by insulation, and never is increased; it should never be insulated. It may be fastened to the building with brackets of wood or staples.

"POINTS.—The attaching to the upper end of a lightning-rod a copper, silver, gold, or any kind of a point, does not add to the utility of the rod, but when attached always diminishes, more or less, the conducting power of the rod, by breaking up the perfect continuity that a rod should possess, and interrupting its polarity.

"SIZE.—An iron lightning-rod should never have less than three inches conducting surface, possessing solidity sufficient to have strength and durability.

"CONSTRUCTION.—A lightning-rod should not possess in its construction sharp edges, neither should it be in sections nor pieces (the sections or pieces being hooked or screwed together), but it should be all in one piece, possessing an equal, even unbroken surface in its whole length.

"APPLICATION.—In the application of the rod to the building the conducting power of the building should be brought into the general line of conduction; that is, the rod should come in good metallic contact with all the important metallic substances upon the outside of the building, such as gutters, spouts, etc. That part of the rod that comes in contact with the earth should be increased in its surface and conducting power, so that there will not be less conducting surface in contact with the earth than is exposed to the building and atmosphere, and care should be taken that the earth around and in contact with the rod is always moist.

"SHADE-TREES.—Shade-trees should not be relied upon as a protection from lightning, because their conducting power varies so much, and very often, when in their best conducting condition, they are damaged by the lightning passing over them. The conducting power of shade-trees, then, should be increased and made permanent by the application of an iron or copper wire.

"ERRORS.—One of the errors committed in protecting from lightning is an improper estimate placed upon the conducting power of the building, compared with the material used for protection. When a lightning-conductor terminates or ends in a substance of imperfect or less conducting power, it is reduced to the conducting power of the body in which it ends.

"Dry earth is a non or imperfect conductor. Earth owes its conducting power to water. According to Cavendish, the conducting power of iron, as compared to the conducting power of water, is as four hundred millions to one. The electrical size of the mass of lightning-rods is not as large as a common knitting-needle, being reduced by so small a portion of the rod's surface coming in contact with damp earth.

"Another error is in constructing the rod in sections. Rods properly applied, of perfect continuity, being all in one piece, without coupling or hooking, have never failed to carry the quantity of electricity that may have passed upon them safely and successfully to the ground, while the sectioned, or the rods hooked or screwed together by burs or nuts, have frequently failed to do their duty. Scarcely a day or a week passes during the summer months but we hear of the failure of the coupled lightning-rods.

"However well the fact of electrical conduction may be known—however well scientific men may be agreed that by the judicious employment of metallic bodies we may increase protection against lightning, certain it is that they have taken too much upon trust, and neglected the investigation of the facts.

"Men ignorant of every electrical principle have professed to furnish security against lightning, until the scientific electrician who attempts to sell lightning-rods is received with jeers and contempt as a designing swindler; his story is listened to with impatience, and his presence considered an intrusion."

The rod recommended by Mr. Cushman is made of four copper and four iron wires laid together, with a pointed cap on the top, and some metal plates at the bottom. There must never be a splice in the wire, but several wires carried up from the ground, in the main body, may be taken off and connected with the metal roof of a building, or with other points.

The following language we used upon a discussion of this subject before the American Institute Farmers' Club:

"As lightning-rods are most commonly constructed, they are not what they are generally conceived to be—that is, attractors of an approaching thunderbolt, picking it up on the sharp points, and conducting it down a carefully insulated rod to a safe deposit in the earth. If a lightning-rod ever performed such a service, I should like to be assured of the fact. At present I have no faith. I believe that, when the atmosphere is surcharged with electricity, any metallic substance will absorb it just in proportion to its natural affinity, and if there is an excess of fluid in the air around the top of a rod, it will run down it to the earth, just as it runs along telegraph wires; and experience has proved that a bright, sharp point is more attractive than a blunt one.

"Still, a blunt rod will become charged, and so will a metal roof, and, more than all, an iron building, and the water-conductor, or whatever other metallic substances reach from the top to the earth, will tend to dissipate the excess of electricity in the air above and around the building, and prevent an accumulation of it sufficient to produce an explosion. But I have not one particle of faith that any building that happened to be situated in the path of what we call a thunderbolt, ever was saved by the best lightning-rod ever erected. And if in its course the discharge from the cloud, coming like a rifle-ball from the muzzle of the gun, happens to strike the sharp point of the rod, it is, to my mind, a preposterous idea to suppose that perfect insulation of that rod from the building can be of any possible advantage."

This opinion we still abide by. The world is full of theories upon the subject. We wish we could elucidate them. We want all these lightning theories reduced to two or three facts. It is claimed by some that iron is the best, and by others that copper is best. One contends that blunt iron is just as good as sharp gold or platina. One says that insulation is necessary, and the other that it is not. Now it is facts that we want. Farmers want to know whether they can protect their buildings from danger of being struck by lightning.

A. B. Dickenson, a practical and close observing farmer of Steuben County, N. Y., is of opinion that no lightning-rod will protect a barn while giving off steam arising from newly stored hay and grain. Then, of what advantage to erect one? for that is the very time it is most needed to save the farmers' barns from destruction, which are much more likely to be destroyed than any other buildings, and the loss is much greater.

Adrian Bergen, of Long Island, relates one case of a barn apparently saved by the conductor. The force of the shock was so great that a man in the barn was knocked down. The rod was a small, round one, fastened to the barn by wooden supports. After the explosion a hole was found at the foot of the rod.

So we have read of many cases where there was an apparent good effect from having conductors upon buildings. A very heavy crash fell upon or over a house and barn in New Hampshire, which melted the points of new conductors and apparently dissipated the fluid so as to prevent damage, though the barn appeared to be filled with electricity.

The Temple at Jerusalem stood ten centuries without being injured; but this building had a great deal of metal about it, and perhaps conductors for water that carried the electricity from the roof to the ground. Yet we have many instances in this country where buildings have been struck that were fully provided with lightning-rods. This may be owing to bad construction of the rods. In the case of a great explosion, like the one in New Hampshire, it is not likely that a single rod could convey all the charge to the ground. If a rod was full of points along its length, it would serve to dissipate the charge, and a square rod is better than a round one.

Wm. S. Carpenter, of the eastern part of Westchester County, N. Y., says:

"The farmers in my section have no faith in lightning-rods, because the proportion of barns that have been struck with rods upon them is greater than those without conductors. A scientific work states that a copper rod one inch in diameter is better than an iron rod four inches in diameter, and nothing less than that seems to be sufficient. This rod, too, must be continuous, and well connected at the bottom with damp earth."

Cases have occurred where a tin roof appeared to act as a great absorbent of the electricity, which it conducted down the tin water-spouts, and in one case into a water-cask, which it burst, and passed on into the wet earth.

Single rods are apparently not always reliable. It is not doubted that an extensive spread of metal diffuses lightning. Then, are buildings safe with metal roofs? Flagstaffs have been torn to pieces on their tops, and no mark of injury left about the dwelling. Would it not answer the purpose and be also economical to place a stout rod on the center of a wooden roof, and attach to the bottom, where it touches the roof, a number of telegraph wires, carried in many directions to the ground? Would the stroke on the center rod be carried safely off by such radii? If so, the plan is vastly cheaper than an entire metal roof. Faraday experimented on iron cages suspended in air—in one of them a man; in another small cylindrical one, a mouse. The cages powerfully charged with electricity, produced no effect on the man or mouse. The plan of one central rod, with many wires covering the building, may produce like results.

It is worth a trial. It is also worthy of observation how many more barns than houses are struck by lightning. A calculation of an average of seven persons to a dwelling in the United States, basing the population at 30,000,000, would give 4,200,000 dwellings. And assuming that there are 5,000,000 of farmers, we may say there are 700,000 barns. Now, greatly as the number of dwellings exceeds that of barns, our opinion is that there are two barns to one dwelling destroyed by lightning.

The impression is common, that barns when first filled with the harvest are attractive of the fluid by the medium of the ascending gas of their contents. This is probably true, and it is our opinion that a rod to serve as a conductor, so as to be a sure protection, must reach higher than this column of vapor. Some barns need several rods; others may need but one. It depends upon the location very much, whether on a damp or dry soil, etc.

Prof. Renwick, of New York, says:

"I doubt whether a barn was ever struck by lightning which was properly protected by a conductor."

Ah! but what is that proper protection? That is what we would gladly tell the farmers. We know of a fact that two barns were burned the last season in Westchester County, which were provided with conductors, which the owners thought as perfect as it is possible to make them. Several cases have come within our knowledge where green trees were torn to shivers near buildings, which saved the buildings from destruction, while lightning-rods on the buildings touched by the trees did not attract or conduct the fluid.

Then, as trees certainly are protectors, let every farmer plant trees around all the farmery. That they are the very best conductors we believe, but they are never tall enough to protect the barn when giving off its towering column of steam.

366. **Material of Conductors and Insulators.**—If a farmer has determined to erect a lightning-rod, the first and most important thing for him to be assured of is, what constitutes the best conducting material. As there are but two materials, copper and iron, and as both are good conductors, and only vary in power according to size, the choice may be regulated by the cost. M. Poulet, a French scientific writer, gives the conducting power of copper as five and a half to six and a half times (varying with the specimens tried) greater than iron. Then, if iron is six cents a pound and copper thirty-six cents, the cost would be equal for a given length of rod. This is probably a fair average of the difference in the conducting power, as Dr. Priestly makes copper five times greater than iron, and Prof. Faraday six and two-fifth times greater. As scientific men have calculated that a copper rod, to possess sufficient conducting power, should be, for short rods, half an inch diameter, and for very long ones, three fourths of an inch, it follows that none of the iron rods in use are large enough, for they are generally under one inch diameter. We believe that that is large enough, and we do not believe that insulators are necessary, but that the rod should be in one continuous piece, and if it can not be welded together on the ground where it is to be erected, it should be firmly screwed together, so as to be as nearly solid as possible.

If the rod is continuous, it may be safely fastened to the building with ordinary iron staples. If it is inserted deep in the earth, so as always to be moist, there is no danger about the lightning leaving it while passing from the cloud to the earth, should it be attracted by the ever bright point which the rod should, and must, possess, to be of any practical value as an attractor of electricity.

Instead of insulating a rod from the house, it would add to its efficiency, if the house has a tin roof, to connect it with the conductor. It would also be beneficial, we believe, to connect the conductor with the tin water-spouts of a wooden building.

367. **The Area of Attraction of Lightning Conductors.**—It is of much importance to a farmer, if he intends to protect his buildings by lightning-rods, to know how far a single rod will afford protection; that is, the area of attraction over which the single bright point of the rod is supposed to exercise an influence—so as to attract or bend a stream of electricity from its course—so

as to carry it down the conductor to the earth without harm to the building. My own opinion is, that the area is much smaller than is generally supposed. If a rod is erected at one gable of a barn forty feet long, projecting ten feet above the peak, we do not believe it would afford the least protection to the other end.

If a conductor is erected upon a dwelling, it should have a point ten feet above each gable and each chimney, and then it is doubtful whether the steam and smoke arising from a wood fire would not prove a better conductor than a rod.

We should not feel any protection from the very best lightning conductor projecting ten feet above the roof, at over ten feet from it. Probably this fact, that the area is very small over which protection extends, may account for buildings being struck and destroyed which were furnished with well-arranged lightning conductors. The area exposed was too great for the attractive power of the rod.

368. **Protection from Fire.**—There is no mistake about the matter of protecting buildings from danger of fire, whatever there may be about protecting them from lightning.

In the first place, have a careful supervisory care in building that no wood is allowed to be placed where it can be heated to a point of ignition. Here is a case in point. In building a chimney upon the soft, damp soil of the Western prairie, where brick was too expensive to encourage excavating down to a solid foundation, the mason suggested placing hewed timber on the ground, to which I readily assented, as it would save brick, and being two feet below the hearth there was no thought of danger from the fire. So upon this foundation the chimney was built, and as it was built right end up, it afforded the opportunity of having large fires, though the fireplace was but a small one.

After keeping a hot fire through several extremely cold days and nights in midwinter, we began to be annoyed by the smell of wood burning in a confined situation. This continued several days, and began to be alarming, yet no one would believe it could be possible that those solid oak timbers under the chimney were being consumed by subterranean fire. Yet it was so, and it was found impossible to extinguish the fire without digging up the hearth, and with great labor working out the most exposed timber; and as the other could not be taken out without danger of throwing down the whole chimney, we saturated it with salt, alum, and lime, to prevent it from taking fire again.

This case we have introduced solely to prove how dangerous it is to allow any wood to come near enough to the fire to be heated very hot, for wood will ignite from heat, without any possible contact with the fire. Another case:

A gentleman in this city set a stove in a lower room, and conducted the pipe through the room above, used as a nursery. For convenience of warming food he had a hole made in a slab of stone, just large enough for the pipe to fit closely. This stone was neatly set in the floor, forming, as the owner and the mason thought, a very safe way to conduct the stove-pipe, which did not stand within a foot of any of the wood-work. It was for a long time a great convenience, and very safe; but one day the stove below was heated pretty hot, and communicated its heat to the stone, and the wooden beams it rested upon, which had been long seasoning, ignited, and the house was within a very narrow chance of destruction. Five minutes more of absence from that room, and it would have been too late.

We could name many instances like these which have come within our own observation, but we hope these are sufficient to put all who read them on their guard against similar dangerous practices in building.

Stove-pipes may be safely passed through floors and wooden walls by inserting an earthen pipe, at least one inch in diameter larger than the stove-pipe, which should not be allowed to touch the earthen pipe, but should be wedged off from it by little pieces of stone, brick, or broken earthenware. This allows a current of air continually to circulate, and renders it impossible to become heated so much as to convey fire through the earthen pipe to the wood-work. If the stove-pipe fits tightly in the earthen one it will be liable to become hot, like the stone mentioned, and set fire to the house.

369. **Windmills and their Use in a Farmery.**—There is one more building, or an adjunct of some of the buildings of the farmery, that should be mentioned, before closing this chapter, more fully than it is in the commencement of Sec. XVII. We allude to the windmill. Besides pumping water, which, by-the-by, would be a great help in the way of protection against fire, a windmill attached to a barn could be made serviceable for a great many purposes, such as threshing, corn-shelling, cutting straw, grinding feed, sawing wood, and turning the grindstone.

Wind is undoubtedly the cheapest power that a farmer can use, and, notwithstanding its inconstancy, the improvement mentioned below operates well, and has been often applied to many valuable uses. By windmills, swamps may be drained and upland irrigated. What an advantage in a drought in many parts of the country, besides the economy of using a great amount of fertilizing matter in water at all times!

We have often suggested the idea of using wind-power to pump up water into a reservoir, or wind up a weight, to be held as a reserved power, that could be used when the wind did not blow.

There is no doubt in our mind that such a cheap power could be economically established to do a great deal of work that requires a motor upon almost every large farm. If the seat of the power is at the barn, it can be carried to the house by a couple of wires, to do the churning. We have seen power carried thus from a water-wheel, nearly half a mile from the dairy, and it was used not only to drive the churn, but the washing machine, the sausage-cutter, a small grindstone, and the coffee-mill. To obtain the power from the wind-wheel, all that would be necessary for the dairywoman to do would be to pull a cord or wire at the house, which would throw into gearing a driving-wheel, and that would, by means of the wires, convey a crank motion from the windmill to the churn, no matter how distant; and the motion can be stopped and started as easily as though churning by hand.

The objection to wind-power is want of constancy. This can only be obviated by accumulating power. If the situation is such that a water reservoir can be filled upon high ground, to be used in a calm, the accumulation of power would not be expensive.

The method of conveying power by wires a long distance, from the water-wheel to the churn, may be seen in several places along the Chenango Canal.

370. **Self-regulating Windmills.**—One of the best contrivances for a self-regulating windmill was invented by Daniel Halliday, of Ellington, Tolland Co., Ct. The size mostly built by him has five-feet wings, that is, the diameter of the wind-wheel is ten feet, and the first one was in operation for six months without a hand being touched to it to regulate the sails. It run fifteen days at one time without stopping day or night, and it stood through some hard gales. The beauty of the improvement is, that it stands still when the wind rages hardest, with the edge of the wings to the wind, and as it lulls they gradually resume their position for a gentle breeze. It is so contrived that nothing but a squall of great severity falling upon it without a moment's warning can produce damage.

The mill mentioned has drawn water from a well 28 feet deep, 100 feet distant, and forced it into a small reservoir in the upper part of the barn, sufficient for all farm purposes, garden irrigation, and "lots to spare." The cost of such a mill will be $50, and the pumps and pipes about $25. It is elevated on a single oak post a foot square, the turn circle being supported by iron braces. The wings are made of one longitudinal iron bar, through which run small rods; upon these rods, narrow boards, half an inch thick, are fitted, holes being bored through from edge to edge, and screwed together by nuts on the ends of the rods. This makes strong, light sails, which, it will be seen, are fixtures not to be furled or clewed up; but they are thrown up edgewise to the wind by a very ingenious and simple arrangement of the machinery, which obviates the great objection to windmills for farm use—the necessity of constant supervision of the sails to suit the strength of the wind.

With this much food for reflection, we will close the chapter upon the farmery.

CHAPTER IV.

DOMESTIC ECONOMY.

SECTION XXII.—THE FOOD QUESTION—QUANTITY, QUALITY, VARIETY, ADAPTATION, ADULTERATION, AND CHANGES PRODUCED BY COOKING, BRIEFLY CONSIDERED.

DOMESTIC ECONOMY! What is it? "*Domestic*, belonging to the house or home; *Economy*, from two Greek words, signifying a house or family law—that which relates to the family concerns of a household, and the disposition or arrangement of any household work."

Such is the character of this chapter. It is full of information useful to every household. Without it, we should have fallen short of our object in writing this book. It was never our intention to make a work for the sole benefit of the male portion of farmers. Much of the preceding chapter, and nearly all of this, is intended to promote the comfort of those who administer all of our home comforts.

We shall also say something that will be valuable upon the subject of the dairy, at least to new beginners in the various arts and mysteries of domestic economy.

No question can be discussed between the master and mistress of the house, nor between parents and a family of growing children, that is of greater importance than the one that heads this section. To the employer and his hirelings, to the master and his slave, it is a question not only of interest, but of health, and it is all concentrated in four words: quantity, quality, variety, adaptation.

There is only one thing more requisite, and that is, that each of these words should be fully understood and properly acted upon. Believing that they are not so, we shall treat upon each briefly in its order. And first—

371. **What Amount of Food is Required by a Hard-working Man?**—This depends on the quality of the food, the nature of the climate, and on such a variety of circumstances that it is impossible to give a satisfactory answer. The average allowance to British sailors in active service is 302 ounces of *solid food* per week, and a pint and a half of rum. Dr. Percy, an English author, mentions the diet of a prize fighter during a course of rigorous training, who ate one pound of mutton at each meal three times a day; at dinner

he ate in addition two ounces of bread, and at each meal drank half a pint of ale. He walked regularly 17 miles per day. The total *solid food* contained in this diet is 350 ounces weekly. We suppose about three pounds of solid food per day in temperate climates may be taken as the average consumed by hard-working men. But in the Arctic and Antarctic regions the amount of food that can be disposed of is truly immense. Thus Ross tells us that the Esquimaux eat 10 lbs. of meat at a meal, accompanied by the same quantity of oil. Parry weighed the food of an Esquimaux lad, scarcely full grown, and found that he consumed, during the day—sea-horse flesh, 8½ lbs.; bread, 1¾ lbs.; rich gravy soup, 1¼ pint; raw spirits, 3 glasses; strong grog, 1 tumbler; water, 1 gallon 1 pint. Cochrane describes a Yakut or Tongouse as eating 40 lbs. of flesh in a day, saying that a good calf, weighing 200 lbs., "may serve four or five good Yakuts for a single meal," and that he has seen three of them "consume a reindeer at one meal." Admiral Saritcheff says he knew a Yakut who consumed "the hind quarters of a large ox, 20 lbs. of fat, and a proportionate quantity of melted butter for his drink" in a day. The admiral tried an experiment with him by giving him "a thick porridge of rice, boiled down with 3 lbs. of butter, weighing together 28 lbs.; and although the glutton had already breakfasted, yet did he sit down to it with great eagerness, and consumed the whole without stirring from the spot; and, except that his stomach betrayed more than an ordinary fullness, he showed no signs of inconvenience or injury." Barrow states that three Hottentots ate one sheep in a day, and that ten of them ate an ox all but the hind legs in three days. The Samoyedes are stated to consume 8 or 10 lbs. of meat at a meal, flavored with a dozen tallow candles, and washed down with a quart or two of train-oil. Extravagant as these statements appear to be, most of them have been verified by numerous observations.

We need not go to savage lands to find gluttons. We have the well-authenticated fact of one who lived in Connecticut, about seventy years ago, who ate three shad a day, upon a wager, thirty days in succession. The same man repeatedly ate a goose or a turkey at a meal. These were acts of gluttony, and we look upon gluttony as a great sin. There is just as much wrong in feeding too much to those who labor for us, who may happen to possess gluttonous natures, as there is in feeding others too little. Every laboring man requires a sufficiency of sound, nutritious food to enable him to perform a fair task of labor. The question is, What is sufficient?

372. **Rations of Southern Slaves.**—The average ration of negro slaves in our Southern States is 3½ lbs. of bacon and a peck of corn-meal per week to each adult. The meal will weigh 14½ lbs., making 18 lbs. of the strongest kind of solid food. Then they always eat potatoes, turnips, greens, pindars, green corn, and other things in their season, enough to make up an average of three pounds of solid food a day.

As it is the policy of planters to give the slaves all the food that is necessary to give them strength, and as it is against the rules of good economy to give more, we may safely calculate that three pounds a day is all that a laboring man requires.

373. **Soldiers' Rations.**—The English are proverbially hearty eaters, and the English government have not only studied economy, but the wants of their healthy, strong men in fixing their rations so as to give all that is necessary, and this is found to consist of the following articles. While the men are in barracks, 1 lb. of bread and $\frac{3}{4}$ of a lb. of meat per day. In camp or actual service, $1\frac{1}{2}$ lbs. of bread and $\frac{3}{4}$ of a lb. of meat. On foreign service, 1 lb. of bread or $\frac{3}{4}$ lb. of biscuit and 1 lb. of meat. When billeted for board, the allowance is 1 lb. of bread, $1\frac{1}{4}$ lb. of meat, 1 lb. of potatoes, and 1 quart of beer.

This was mainly followed in the American army until the summer of 1861, when in consequence of grumblings among the soldiers about insufficient food, the rations were increased, and are now as follows:

Rations—Daily—$1\frac{1}{2}$ lbs. of pork or bacon, or $1\frac{1}{4}$ lb. of fresh or salt beef; 22 oz. of bread or flour, or 1 lb. of pilot bread.

Rations to One Hundred Men—Daily—Eight quarts of beans, 10 lbs. of rice or hominy, besides 1 lb. of potatoes three times a week to each man, or a substitute therefor; 10 lbs. of coffee; 15 lbs. of sugar; 4 quarts of vinegar; $1\frac{3}{4}$ lbs. of adamantine candles; 4 lbs. of soap; 2 quarts of salt. Extra issues of molasses occasionally made.

Rations may be commuted at forty cents per day when stationed in cities, or when there is no opportunity of messing, or when in regular camp, at the cost of the rations.

374. **Variety of Food.**—Man craves a change of food, that is, a variety of substances, either one of which would sustain life, but would not be satisfactory. Nature demands the variation, and the mixing together of the several substances. Why? Simply because no one will give all the elements that go to make up the animal economy. One article furnishes phosphate for bones, which another article is destitute of, yet it may contain matter that will clothe the bone with muscle. Food that contained neither fat nor sugar would be insufficient to keep up the animal heat. Food that contained all the elements of bone, muscle, fiber, fat, and heat-producing qualities, might be so concentrated as to be unwholesome.

A man fed upon pemmican would have a disposition to eat straw, husks, and twigs, or gnaw the bark from trees to get something to distend the stomach, and enable it to perform its functions healthily. Let this be thought of in feeding domestic animals as well as men. It will furnish an easy rule for your guidance. Judge them by yourself, and act accordingly. You will find it an easy and sure road to success. We do not for animals, quadruped or biped, recommend, a variety of food at the same meal—only a change from time to time, so as to give variety, and consequently all the elements necessary to produce growth.

And neither man nor beast will reach a high point in the scale of perfection who is confined to one single article, or to two or three articles of food. Look, for example, at the rice-eating nations; also to those who, like the Esquimaux, live principally upon the fat of seals and whales; or to savage nations, confined to an almost exclusive diet of meat. Each shows a lack of some quality that we consider essential in civilized man. The confinement of a large portion of a nation of people to a diet of potatoes is rapidly working a deterioration in the race.

"The profusions of nature tempt the appetite of man. The productions of all the earth are at his command. But, for the control of his appetites, man is endowed with reason and conscience. The brute is governed in regard both to the quantity and kind of its food by an instinct from which it rarely deviates, unless when domesticated, and consequently corrupted.

"There are three practical laws to be observed in the taking of food. One regards the time, another the quality, and the third the quantity.

"An interval of at least five hours should elapse between meals *for adults*, unless some extraordinary exertion has exhausted the system, or something has interrupted or prevented the reception of a full meal at the stated hour. The stated hours should be regular."

375. **Quality of Food Suited to a Farmer's Family.**—"As to the quality of the food, there is no doubt that the more simply it is cooked the more easily it is digested.

"Chemical analysis should be the guide for the cookery book.

"No one would think of eating raw potash, a substance that dissolves metals, but we do not hesitate to eat saleratus, which is a modified preparation of it, and has the same, though a more gradual effect, upon the organic tissues and the blood. Soda, it is well understood, rots cloth and takes the skin from the hands when it is put into soap, or even when used to 'break hard water,' as the washerwomen term it; yet we put it into bread and cakes. Our stomachs were not made to digest metals, and when we powder them and eat them, we try to cheat nature.

"Spices were undoubtedly made for use in those climates where they grow, but the natives of those climates use them much more sparingly than we do. We may reasonably suppose that they are more adapted to the wants of hot climates than of cold ones, as nature has placed them in the former, and yet we saturate our food with them, mix them together, destroy the flavors of each by so doing, and make a stimulus to appetite by a conglomeration, which is a most unnatural one, and gradually injures the very power of digestion. We thus conceal, also, that fine aroma of vegetables and meats which distinguishes one from the other, and deprive ourselves of the pleasure God designed we should feel in partaking of them. There is a delicate fruit of the tropics resembling a muskmelon, which grows, however, not upon a vine, but upon a tree, the taste of which is so finely delicate, that a foreigner can not even perceive it at first; but if he does not cover it with pepper and salt, as we have seen many foreigners do, to 'give it a taste,' he will, after partaking of it a few days or weeks (according to the simplicity or sophistication of his appetite), appreciate its flavor, which is that of the most delicate aromatic nut. In our climate we lose the flavor of many vegetables in the same way, by covering them with pepper, and also by putting them into water below the boiling-point when we cook them. Every one who is so happy as to live in the country, and can gather vegetables daily from his own garden, knows the difference between them when gathered thus and properly cooked, and those which have been picked and kept for market even one night.

"When substances like rice, corn-starch, and farina are used, which have very little taste (rice, because it has been so long exposed to the air after it is gathered, and corn-starch and farina, because, from the mode of their preparation, they lose a great part of the nutritious ingredients of the corn), a delicate flavoring of spice may be used without injury to health.

"Science may at last bring us to the conclusion, that each climate and region produces those articles of food which it is most healthful to eat in their respective localities.

"The quality of children's food should differ from that of adults, so far as that it should consist of more substances containing starch, gum, and sugar.

"It is not the most costly or most luxurious living that we would advocate, but it is a variety of food. The difficulty is, that we are tempted sometimes by a great variety of dishes at one meal to eat too much. This is no argument against variety of food.

"It is important that we should study to increase earth's products, and improve their quality, to produce the highest condition of perfection in man. A man, it is true, may be a glutton, and consume mountains of flesh and rich dishes, but that is not the point. It is that we all should consume the best food possible to be produced, and in sufficient variety to give healthy results."

376. **How Food Affects the System.**—"The prevalent idea that soup which sets into strong jelly is most nutritious, is altogether a mistake. The soup sets because it contains the gelatin of the sinews, flesh, and bones; it has been fully proved that no animal can live upon this imagined richness alone. In fact, such jelly is unwholesome, for it loads the blood with useless substances; hence what are termed rich soups, being loaded with gelatin, are not ranked among the articles of wholesome food. Marked results of the effects of cooking upon food may be seen in the contrast between civilized and savage nations. In every nation on earth, those who rule the masses are invariably better fed than the masses themselves. This is evidenced in the power exercised by the beef-eating British over the rice-eating East Indian nations." It is further evidenced by the condition of the people of this country, where the masses are better fed than in any other on earth, and where there are greater numbers of men fit to be rulers than in any other. And this proportion will increase as the laws of hygiene are better understood, for then, those who control the preparation of food for those

masses will understand how cooking affects the raw material of food, so as to make it wholesome and nutritious, or otherwise.

Next to the knowledge of the differences in the human constitution and the nature of food proper for man, the art of cooking so as to make the food most agreeable to the palate should be studied by every good housekeeper. Bear in mind that in preparing food three things are to be united—the promotion of health, the study of economy, and the gratification of taste.

Pie-eating is an Americanism that we can not approve nor recommend to the extent it is practiced. Though pie be nearly allied to piety, this does not save it from condemnation. Pies are eaten for breakfast, for lunch, for dinner, supper, and many go to bed on pies. "Oh, pies save a great deal of cooking!" says the frugal housewife, "and are so convenient for the children to take to school, and then they are not so hungry when they have pie to eat." Pies are New England's favorite refection; but that does not prove them, as a general thing, well adapted to the wants of the human system. Pies of every description, as used in almost every New England farm-house, may safely be classed "unwholesome food." The worst of the family is the one most prized—the rich, sweet, highly spiced mince-pie. It is one of the prolific parents of dyspepsia.

377. **Adaptation of Food to Circumstances.**—One of the great mistakes of many families is in not adapting the food to the season, the climate, and circumstances. A hard-working negro slave may eat fat bacon and corn-bread in August, and bask in the sun in Mississippi. It would not be good diet for a sedentary white man.

Fruit is an essential article of food for the preservation of health, in bilious localities. It seems particularly adapted by nature to that end.

A sensible man always adapts his eating to his labor. The following remarks upon this subject we adopt, because they are pertinent:

"I have been asked sometimes how I could perform so large an amount of work with apparently so little diminution of strength. I attribute my power of endurance to a long-formed habit of observing, every day of my life, the simple laws of health, and none more than the laws of eating. It ceases any longer to be a matter of self-denial. It is almost like an instinct. If I have a severe tax on my brain in the morning, I can not eat heartily at breakfast. If the whole day is to be one of exertion, I eat very little till the exertion is over. I know that two forces can not be concentrated in activity at the same time in the body. I know that when the stomach works, the brain must rest—and that when the brain works, the stomach must rest.

"If I am going to be moving about out of doors a good deal, I can give a fuller swing to my appetite, which is never exceedingly bad. But if I am engaged actively, and necessarily in mental labor, I can not eat much. And I have made eating with regularity and with a reference to what I have to do, a habit so long that it ceases any longer to be a subject of thought. It almost takes care of itself. I attribute much of my ability to endure work to good habits of eating, constant attention to the laws of sleep, physical exercise, and general cheerfulness.

"There is one thing more to be said in this connection. It is not a matter of epicureanism that a man should be dainty concerning the food he eats. On the contrary, I hold that a civilized man ought to be civilized in his cookery. I suppose one of the infallible signs of the millennium will be a better regulated kitchen—a kitchen that sends out food that will help to promote health and increase Christianity."

378. **The Food and Clothing a Man may Consume in a Lifetime.**—Alex. Soyer's "Modern Housewife" gives the following calculation as the probable amount of food that an epicure of seventy years might have consumed. "Supposing his gastronomic performances to commence at ten years, he will make 65,700 breakfasts, dinners, and suppers, to say nothing of luncheons and extra feastings. To supply the epicure's table for sixty years, Soyer calculates he will require 30 oxen, 200 sheep, 100 calves, 200 lambs, 50 pigs; in poultry, 1,200 fowls, 300 turkeys, 150 geese, 400 ducklings, 263 pigeons; 1,400 partridges, pheasants, and grouse; 600 woodcocks and snipes; 600 wild ducks, widgeon, and teal; 450 plovers, ruffs, and reeves; 800 quails, ortolans, and dotterels, and a few guillemots and other foreign birds; also 500 hares and rabbits, 40 deer, 120 Guinea-fowl, 10 peacocks, and 360 wild-fowls. In the way of fish, 120 turbot, 140 salmon, 120 cod, 260 trout, 400 mackerel, 300 whitings, 800 soles and slips, 400 flounders, 400 red mullet, 200 eels, 150 haddocks, 400 herrings, 5,000 smelts, and some hundred thousand of those delicious, silvery whitebait, besides a few hundred species of fresh-water fishes. In shell-fish, 20 turtle, 30,000 oysters, 1,500 lobsters or crabs, 300,000 prawns, shrimps, sardines, and anchovies. In the way of fruit, about 500 lbs. of grapes, 360 lbs. of pineapples, 600 peaches, 1,400 apricots, 240 melons, and some hundred thousand plums, green-gages, apples, pears, and some millions of cherries, strawberries, raspberries, currants, mulberries, and an abundance of other small fruit, viz., walnuts, chestnuts, dry figs, and plums. In vegetables of all kinds, 5,475 lbs. weight, and about 2,434¾ lbs. of butter, 684 lbs. of cheese, 21,000 eggs, 800 tongues. Of bread, 4½ tons, half a ton of salt and pepper, near 2½ tons of sugar. His drink during the same period may be set down as follows: 49 hogsheads of wine, 13,683 gallons of beer, 584 gallons of spirits, 342 gallons of liqueur, 2,394¾ gallons of coffee, cocoa, tea, etc., and 304 gallons of milk, 2,736 gallons of water. This mass of food in sixty years amounts to no less than 33¾ tons weight of meat, farinaceous food and vegetables, etc., out of which I have named in detail the probable delicacies that would be selected by an epicure through life. But observe that I did not count the first ten years of his life, at the beginning of which he lived upon pap, bread and milk, etc., also a little meat, the expense of which I add to the age from then to twenty, as no one can really be called an epicure before that age; it will thus make the expenses more equal as regards the calculation. The following is the list of what I consider his daily meals:

"BREAKFAST.—Three quarters of a pint of coffee, four ounces of bread, one ounce of butter, two eggs, or four ounces of meat, or four ounces of fish.

"LUNCH.—Two ounces of bread, two ounces of meat, or poultry, or game, two ounces of vegetables, and a half pint of beer, or a glass of wine.

"DINNER.—Half a pint of soup, a quarter of a pound of fish, half a pound of meat, a quarter of a pound of poultry, a quarter of a pound of savory dishes or game, two ounces of vegetables, two ounces of bread, two ounces of pastry or roasts, half an ounce of cheese, a quarter of a pound of fruit, one pint of wine, one glass of liqueur, one cup of coffee or tea; at night one glass of spirits and water."

To this we have added the following calculation of the clothing the same man may have used. We estimate that a full-dressed man carries about fifty yards of cloth upon his body, or at least it has taken so many square yards of cloth to make the following garments: one under and one over shirt and drawers, eight yards; vest, with all its inside and out, four yards; coat, overcoat, and cloak, 32 yards; the handkerchiefs in the coat and cloak pockets, two yards; pants, lined, four yards. Then we may add a night-shirt, four yards, and morning wrapper, 10 yards, and we have 64 yards for a single suit. Allow six of these suits a year—of some garments he will want more, and some less than six, but take that as an average, and we have 384 yards for the gentleman's wardrobe one year. Multiply that by sixty years, and we have 23,040 yards of cloth, which appears a fair allowance, as we throw out the ten years of childhood. With these garments he will want each year two pair of boots, two pair of shoes, two pair of slippers, two pair of rubbers or overshoes—480 pairs. With these he will wear sixty dozen pairs of stockings and (four hats a year) 240 hats. I will say nothing about the yards of cloth that he will want about his toilet and table, his carpets and curtains, and his bed, with its daily change of bedding; but you can imagine it would make a large spread. The great question for consideration, in an agricultural point of view, is this: Could such a consumer of earth's products produce as much as he consumed, with all industry applied during life, or would he be dependent upon the labor of others?

379. **How Cooking Changes Food.**—We are not going to make a cook-book, but simply to attract attention to some of the leading scientific principles of the effect of fire upon articles of food.

Meat, for instance, often loses more than half its substance, which is wasted and lost in the process of cooking, because the cook did not understand some of the simple elements of the chemistry of cooking, and the effect of water and heat upon flesh.

If meat is to be boiled for eating, particularly fresh lean beef or mutton, never soak it in cold water. Have your water boiling over a brisk fire, and plunge the meat into it, and see that the heat is kept up. If soup is to be made, then the meat should soak a long time in cold water, because it extracts the substance that is wanted in the soup, leaving the fibrous portion of the meat almost worthless. If the meat is to be boiled for eating, plunging it in hot water has the same effect that is produced upon an egg—the albumen is coagulated, and remains in the meat, and cooks with it, and becomes the most nutritive portion of it. Therefore remember it as one of the most important items of knowledge about cooking, never to put a piece of meat into water to boil, unless the water is boiling hot; and never put a piece of meat to roast until your fire is very hot; and if it goes into an oven to bake, see that the oven is hot enough to cook the outside almost instantly. If you let it simmer slowly, it will ooze out the richest portion of its property for food. "The first effect of applying a strong heat to a piece of fresh meat, is to cause the fibers to contract, to squeeze out a portion of the juice, and partially to close the pores so as to prevent the escape of more. Heat is applied to meat chiefly in three ways—boiling, roasting, and baking. During these operations, fresh beef and mutton, when moderately fat, lose, on an average, about as follows:

	In boiling.	In baking.	In roasting.
4 lbs. of beef lose	1 lb.	1 lb. 3 oz.	1 lb. 5 oz.
4 lbs. of mutton lose	14 oz.	1 lb. 4 oz.	1 lb. 6 oz.

The greater loss in baking and roasting arises chiefly from the greater quantity of water evaporated, and of fat which is melted out by either of these two methods of cooking.

"In preparing meat for the table, we discover that it is most desirable to retain all the ingredients of its juice; how this is to be done will depend much upon the method of culinary procedure. If the piece of meat be introduced into the water when briskly boiling, the albumen at its surface, and to a certain depth inward, is immediately coagulated, thus inclosing the mass in a crust or shell, which neither permits its juice to flow out, nor the external water to penetrate within, to dissolve, dilute, and weaken it. The greater part of the sapid constituents of the meat are thus retained, rendering it juicy and well-flavored. It should be boiled for only a few minutes, and then kept for some time at a temperature from 158 to 165 degrees. Meat is underdone or bloody when it has been heated throughout only to the temperature of coagulating albumen (140 degrees); it is quite done or cooked when it has been heated through its whole mass to 158 or 165 degrees, at which temperature the coloring matter of the blood coagulates. As in boiling, so in baking or roasting; for whether the meat be surrounded by water or in an oven, as soon as the water-proof coating is formed around it, the further changes are effected alike in both cases, by internal vapor or steam. In roasting or baking, therefore, the fire should be at first made quite hot, until the surface-pores are completely plugged and the albuminous crust formed. Hence, a beefsteak or mutton-chop is done quickly over a smart fire, that the richly-flavored natural juices may be retained."

The above is extracted from a most valuable book—one that no housekeeper can afford to do without. It is "Youmans' Hand-Book of Household Science." It is science in such an attractive form that all may read it with pleasure and profit. We shall draw upon its valuable store-house of knowledge for other facts in confirmation of what we have to say upon the food question.

380. **How the Albumen of Meat is Extracted.**—When we wish to dissolve out the albumen, and not the gelatin of meat, for soup or for beef-tea, which is much used as nutritive food for the sick, the meat should be cut fine—the finer the better—and soaked a few minutes in an equal weight of cold water, then slowly heated to boiling, and so continued a few minutes more, and when strained you will have as much weight of pure extract as you had of meat, and it will afford equal nutriment. It would not do so if boiled for hours, in a large mass. Hence, meat for soups should be finely divided. The effect of long boiling of meat for soup is to thicken the soup, and make it apparently richer; but it is so only apparently. The albumen is extracted by cold water. It is cooked in the water in as short a time as an egg would cook. The substance extracted by long boiling, making the soup appear thick when cold, is gelatin. Still further boiling would make glue, which would harden by drying, like the glue of commerce. It is not considered a nutritious kind of food.

381. **French Experiments with Gelatinous Food.**—"The French attempted to feed the inmates of their hospitals on gelatinous extract of bones; murmurs arose, and a commission was appointed, with Magendie at its head, to investigate the matter, the conclusion of which was, that giving gelatin to the poor was just equivalent to giving them nothing at all. The use of gelatin as a nutritive or invigorating substance may be regarded as given up. The utmost claim now put forth for it is that, mixed with other food, it makes it go further; but at the same time we must be careful not to use it to excess, as it is apt not only to weaken the individual by its insufficiency as an article of diet, but causes also diarrhea, whether by acting as a foreign body, or by some spontaneous decomposition. Hence the unwholesomeness, to healthy stomachs, of dishes containing a great quantity of gelatin, such as mock-turtle soup, calves'-foot jelly, etc."

The healthiness of any kind of strong meat soup is not a matter of doubt in the minds of those who have given the subject a thought. It may be taken in small quantities at the beginning of a meal, when it will be immediately followed with fibrous food; but the appetite never should be satisfied upon soup alone, unless it is *soup-maigre*, or soup made almost entirely of vegetables.

382. **Relative Values of Food for giving Warmth or making Flesh.**—The following table shows Liebig's estimate of the proportion of warmth-giving substances to the flesh-producing substances in various articles. Basing the flesh-producing power at 10, each of the following articles gives the proportion of warmth-producing power set opposite.

Human milk	40	Fat pork	30	Rye flour	57
Cow's milk	30	Beef	17	Barley	57
Lentils	21	Hare	2	White potatoes	86
Horse beans	22	Veal	1	Black potatoes	115
Peas	23	Wheat flour	46	Rice	123
Fat mutton	27	Oatmeal	50	Buckwheat	130

This table gives a sufficient explanation of the reason why buckwheat is always used as winter food. The reason is still more apparent when we know that butter and syrup, which are eaten with buckwheat cakes, are also producers of heat. It shows that veal is a very fit food for children and very unfit for aged people. In cold climates, particularly, where men are much in the open air, they instinctively crave fat meat. At the tropics, instinct teaches man to consume an abundance of fruits and vegetables. In temperate regions, where we may indulge with impunity in a variety of food, instinct is not so strong, or at least does not point out so unerringly what we should eat, and therefore the question should be more fully discussed; for among all the arts of civilized life there are none in which all are more interested than the preparation of our daily food.

383. **Changes produced in Cooking Vegetables.**—Many vegetables, for instance the potato, in a raw state, are wholly unfit for food. Every housekeeper knows that cooking renders them palatable and wholesome, but every one does not know how they are affected by heat, nor why one mode of cooking makes them acceptable to the taste, while they may be nearly spoiled by a different application of heat. Hence it is not always applied in the right manner to produce the best effect.

It is often said of potatoes, "they were spoiled in the cooking." Look at the reason. A pound of potatoes contains on an average about three quarters of a pound of water and two to two and a half ounces of starch. It also contains about one fourth as much sugar and gum as it does starch, and about one sixth as much woody fiber.

If a good, sound potato is plunged whole into boiling water and kept boiling until softened throughout to such a degree that it could be readily mashed, the starch-grains burst and absorb the water, so that the mass appears more like meal than like starch boiled in water, and is then in a condition to afford its nutritious properties readily to the system. If potatoes are naturally bad, cooking will not make them good, but bad cooking will make the best potatoes quite unfit for human food. If they are put into cold water and simmered slowly till soft, they will generally become so waxy that they are quite indigestible.

If potatoes are roasted or baked, they should be put into a hot oven or buried in hot embers, and kept hot until taken out, which should be as soon as sufficiently cooked—otherwise a new change takes place, the water begins to evaporate, and the outside burns, while the interior soon becomes worthless.

In frying potatoes, the starch and fibrin are often turned to charcoal, which is just as nutritious and digestible as charcoal made of wood. As it is with potatoes, so it is with many other vegetables—they may be spoiled by improper cooking. As a general rule, put all into boiling water and keep it boiling briskly till the articles are sufficiently cooked. Never attempt to cook green vegetables in what is termed hard water; it will sometimes render green peas wholly unfit for food. The difficulty is often remedied by putting a little lump of potash, saleratus, or soda in the water. If too much is used, it causes the vegetables to fall to pieces.

384. **Reasons for Improved Cookery.**—Erasmus says: "Bad feeding makes the vulgar seditious and quarrelsome." Perhaps this will account for the quarrelsome character of some families. We seriously think every young woman should have some knowledge of cooking. Ignorance upon this subject ought to be a reproach. Few nations have the wealth of material for fine cookery that we possess. Fish, flesh, and fowl are abundant; fruits and vegetables unsurpassable, and can be raised without great labor or expense, and it is owing to our own culpable carelessness in all that pertains to health that we are not the healthiest, best fed, and best trained people in the world. Yet Americans generally undervalue preparations for eating. Disdaining gluttony, despising pampering to fancies, they run into the opposite extreme of neglecting that which is of real value to their bodies. This inattention proceeds not from inability to comprehend the science of cookery, nor real dislike to good things, for their appreciative power of such is on a par with that of other nations; but they grow up with the idea that it is unbecoming to be dainty, and beneath their dignity and independence of character to think too much of their stomachs. American mothers too seldom instruct their daughters in the culinary art.

In early times necessities were stronger than comforts; kitchens were unfurnished with conveniences; cooking utensils were clumsy and scarce; pots and kettles did double duty; iron skillets were used instead of saucepans. This is not and need not be the case now. Every farm-house should have all the modern improvements for cooking, and then as a general thing our cooking should be better; and as necessities are no longer stronger than comforts, the reason that we lack the comforts is because our young American housekeepers lack the knowledge, and, for a certainty, their Irish cooks do not possess much of the science of the useful art of cookery.

Every beginner thinks it an easy thing to learn, and, without any knowledge of the necessary rudiments, expects to blunder into some sort of proficiency, so that in time the mistakes come to be regarded as the rule, and they abide by their own experience, rather than accept of rules that science teaches.

Another, and perhaps to most people the most important reason for improved cookery is, the economy of food. "What shall we eat?" and "How shall it be cooked?" should be made a part of the household economy of every family, particularly every one who purchases food by the wages of daily labor. This question is not an idle one, and only interesting to those who live in cities. It is equally so to those who furnish the city with food. Let us glance at the prices which the consumers in the city have to pay.

Of late years, the price of butchers' meats in New York, at retail, have been frequently at the following rates:

For roasting pieces of beef and beef-steaks, the nominal price per pound is from 18 to 25 cents, while the real price, owing to the cheating in weight, is often 25 per cent. higher. A piece only fit for soup is charged at about 12 or 15 cents, and a shin-bone, with very little meat, rates at 10 cents a pound. Plates, navels, necks, briskets, and rounds are rarely sold fresh, and one of the strongest reasons given by butchers for selling the portions universally called for at such high prices is, that they can not retail the coarser parts at any price, except the small portion taken as corned beef, and for this the price is sometimes from 12 to 18 cents a pound. A leg or loin of mutton is sold at 16 to 20 cents a pound, and all the coarser parts at 12 to 16 cents, and some of them are coarse and poor enough. Veal that is fit to eat, is sold at about the same price per pound as mutton. Lamb is fifty per cent. higher. Fresh pork—miserably poor, too—sells at 12 to 15 cents. Salt pork and smoked bacon sell for 15 to 18 cents, and smoked beef the same.

When the greatest meat-eating people in the world pay such prices, it would be reasonable to expect that they would be willing to learn and practice improved cookery. We are sorry to say that they do not. A school that teaches the art is rare. It should, as a universal rule, be taught in all schools. In many families, with all the economy of the best housekeeping, it certainly is a question of serious import as to what we shall eat, that will afford sufficient nourishment and variety of food for health, and still enable those whose income is limited to keep expenses below that limit. In such families it is important that they should learn how to cook butchers' meat more economically than it is generally in America. In some measure advantage can be taken, though it seldom is, in buying fresh meat. The price by the piece or by the quarter, of beef and mutton, often varies fifty per cent., and a fore-quarter always sells the lowest; yet, to the consumer, it is absolutely the most valuable.

The truest economy is to eat less expensive meat and more vegetables, and learn how to compound them as the French do, so as to make wholesome, nutritious, economical food by improved cookery.

385. **Water for Cooking.**—One reason why we have treated so largely upon cisterns (see 333, 334), and why we made one for family use while we had a never-failing well of water, is because rain-water is the best of all for culinary purposes. What is termed hard-water is unfit for cooking some kinds of vegetables, and is never good for tea. We have already stated that water is sometimes so hard that green peas could not be cooked soft in it. On the other hand, care must be taken in the use of rain-water, or the tender vegetables will be broken down by a little over-boiling. In such water always be careful to throw as much salt as will serve to season the vegetables for the palate. Onions lose nearly all their peculiar flavor when boiled in soft water without salt. This matter of suitable water for the kitchen has quite as much importance to the cook as it has to the laundress.

386. **A New Cooking Vessel Wanted.**—A writer in the *Scientific American* suggests an improvement in cooking vessels that we hope will be at once

acted upon. It is to coat the inside with silver or platinum, which could be done by the galvanic battery, so that the expense would not be too great for ordinary use in the houses of those who are able to live in a way suited to a high order of civilization. This would be a particularly desirable improvement in kettles for heating water for tea. So it would for such cookery as requires porcelain-lined kettles. From the greatly increased supply of silver from Washoe, Arizona, and other silver mines, we may yet be able to improve our domestic utensils. Iron, copper, brass, zinc, are all objectionable for many purposes, and porcelain lining is soon destroyed by careless cooks.

387. **Flour—How to Select Good.**—Farmers of all the Eastern States buy flour, and some of them are not very good judges of what they buy. There are a few plain rules to observe in buying flour by which you can tell its quality, and select that which is good. The best flour is not snowy white, but has a yellowish tint when a handful is squeezed together and then broken open. Lay a little in the palm of your hand and smooth it with a knife or your finger, and see that it is free from specks, and of even fineness, but not an impalpable powder. To prove this, throw a little lump against a perpendicular board or smooth wall, upon which the most of it, if good, should stick. Good flour, squeezed in the hand, will retain its shape. If you wet a little in your hand, see that it does not work soft and sticky, or you may get spring-wheat instead of winter-wheat flour. Flour that works sticky is not good. If it has a bluish tint it is not good. If it falls in dry powder when thrown, or if it falls apart, dry and powdery, when squeezed, it is not good. We commend to all families who buy flour the trial of these tests with the flour now on hand, the quality of which is known.

388. **Adulterations of Food.**—The first object of a housekeeper should be to procure unadulterated articles. This is very difficult for city people to do, owing to the adulteration of almost every article of food prepared for sale. But this is not the case with most of the food used by farmers, because it is made of home products.

Many of the adulterations of such articles as are usually purchased may be detected by simple tests. The microscope reveals the adulterations of flour, sugar, farina, arrow-root, starch, salt, etc.

Bread, that most important article of food, is always more healthful in a farmer's family, because it is free from adulterations, or at least much more free than baker's bread.

389. **How Eating Affects the Health.**—To meet at the breakfast-table, father, mother, children, all well, ought to be a happiness to any heart; it should be a source of humble gratitude, and should wake up the warmest feelings of our nature. Make it a rule never to come to the table in a churlish mood. Let joy pervade your meals.

"The tables of the rich and the nobles of England are centers of mirth, wit, and *bonhomie*, and they live long. It takes hours to get through a repast. The negroes of a well-to-do family in Kentucky, while at their meals, abandon themselves to jabber and mirth, and they enjoy life. At the family-table all should meet to make a common interchange of high-bred courtesies; of warm affections; of cheering mirthfulness, and that generosity of nature which lifts us above the brutes which perish; for such things promote good digestion, health, and long life. Children in good health, if left to themselves at the table, become, after a few mouthfuls, garrulous and noisy; but if within bounds at all reasonable or bearable, it is better to let them alone; they eat less, because they do not eat so rapidly as if compelled to keep silent, while the very exhilaration of spirits quickens the circulation of the vital fluids, and energizes digestion and assimilation."

Let this excellent advice of *Hall's Journal of Health* be followed universally, and we shall hear less about dyspepsia.

390. **Early Breakfast—its Effect on Health.**—"Breakfast should be eaten before leaving the house in the morning for exercise or any description of labor. Those who practice this will be able to perform more work, and with greater comfort and alacrity, than those who work an hour or two before breakfast. Besides this, the average duration of the life of those who take breakfast before exercise or work will be a number of years greater than those who do otherwise.

"If early breakfast were taken in regions where chill and fever and fever and ague prevail, and if in addition a brisk fire were kindled in the family room for the hours including sunset and sunrise, these troublesome maladies would diminish in any one year, not ten-fold, but a thousand-fold; because miasm is more solid, more concentrated, and hence more malignant about sunrise and sunset than at any other hour of the twenty-four."

This, and much more said upon the same subject by Dr. Hall, agrees fully with our long experience in a miasmatic region of the West. The most industrious people who come from New England, where they had always been accustomed to early rising and working before breakfast, were the ones most liable to attacks in autumn of bilious fever and ague. Let us therefore urge every resident in such a region, never to go to work, nor go much out of doors before breakfasting, and let no expense or trouble about the work deter you from having your dwellings purified by fire. In some parts of South Carolina men have lost their lives from a single night's exposure to miasm, without fire. Hence, whenever persons are compelled to spend a night in such a situation, their first care is to build a large fire and, without sleeping, keep near it, even in the smoke, and thus they escape the danger of the poisonous atmosphere.

SECTION XXIII.—THE BREAD QUESTION—VARIETIES AND QUALITY OF BREAD, AND HOW IT IS MADE—YEAST, AND HOW TO MAKE IT FOR FAMILY USE.

SUCH is the importance of the subject in relation to the healthiness of food, that bread should be of the very best quality, we have devoted a section especially to its consideration. In this country it is the general custom to make bread in families, and as our domestics are not scientific, it is in many cases absolutely necessary that they should not be left to the temptation of using the readiest means for making bread acceptable, by putting in the convenient saleratus or soda, which, like charity, in that particular, covers a multitude of sins. If the dough has been put together over-night, it may have gone on to the stage of acetous fermentation, and a little saleratus (more than is necessary to sweeten it is often put in) will conceal the fact, and make all appear right. It will also save the trouble of kneading well. Let the mistress, then, if she do not actually mix the bread, overlook the process; and it would be a good custom if all the ladies in a family would take their turn at bread-making, and thus insure its good qualities by efficient kneading. It can not be kneaded too much. But of that hereafter, and in all that pertains to the subject, we hope to give some useful information to all who are not already good bread-makers. Not only in bread, but in every article consumed upon the farmer's table, we beg of him and the mistress of the family never to lose sight of the importance of quality. The proper consideration of this question will save many a doctor's bill, as well as the misery attendant upon sickness.

There is nothing that the good housekeeper so much desires about her cooking as to have good bread, and as all have not had the advantages of the daughters mentioned in the following extract of a letter to the author, we shall give as much information as we can crowd into a brief space upon this subject.

391. **Good Wheaten Bread, and How to Make it.**—The letter alluded to is from a sensible, practical woman, who says:

"I have been a housekeeper thirty years, and I have reared a family of six daughters, and we have always made our own bread, and it is a very rare thing for us to make poor bread.

"Now, the first thing I strive to teach my girls is cooking, and making bread is one of the first items of cookery. I know that good bread can be made by the different kinds of yeast, but the recipe that is the most simple is the best.

"Here is my way of making good bread: Take one pint of warm water, one teaspoonful of salt, put it in a dish sufficiently large to admit of stirring in flour until it is a thick batter, and keep it warm, quite warm, and in five hours it will rise or become fit for use. If it does not rise sufficiently, dissolve a piece of common soda as large as two kernels of corn and stir into the batter.

"You can make three common-sized loaves of bread with this yeast, which will be nice and tender. The soda is only necessary when the flour is of an inferior quality."

The following directions for making bread we give in the language of another good housekeeper. She says:

"To have good, wholesome bread, it is absolutely necessary to pay attention to the making of it, and to believe that making bread, like learning to read, does not come by nature; that it is indispensable to learn every little fact connected with the fermenting or raising of the dough; absolutely necessary to understand the difference between vinous and acetous fermentation, and when an alkali, such as saleratus or bicarbonate of soda, is required.

"Of course, good flour is the first requisite. The finer the flour the greater the labor in kneading it; and the finest flour does not always make the sweetest and healthiest bread, yet the best flour is the cheapest; though I must confess I can not advise about using inferior flour, for I have never had any.

"The next important thing is the yeast, and I give the preference to tha made of potatoes. I have tried brewer's yeast, baker's yeast, yeast cakes, hop yeast; leaven, which is a bit of sour dough, and needs saleratus to make the bread sweet; in fact, all the various kinds of yeast, and after over two years of constant use, I am content with potato yeast.

"The rule of making it is this: Take ten potatoes of nearly equal size—wash and boil them; when cooked, peel and mash them perfectly smooth; pour on to this a quart of boiling-hot water; stir in a coffee-cup of good, pure sugar, and after standing a few minutes, pour in a quart of boiling water wanting a gill; when lukewarm, add a pint of yeast to raise it, put it in a tightly-covered vessel to ferment, and set it away in a moderately warm place until sufficiently risen, which may be known by the potato appearing upon the top of the liquid, and light, foamy spots bursting up through it. The temperature of the place where this is set to rise or work should be from 68 to 74 degrees; too much heat is as bad as too much cold. When this is risen, put it into a stone jug and cork it; tie in the cork and keep it in a cool place. A gill and a half, or common-sized teacupful, is sufficient to raise dough for two large loaves of bread. The source of the sourness which supervenes in bread, under careless or unskillful hands, was formerly ascribed to each of all the constituents of flour; to its gluten, which is 10 parts; its starch, which is 70 parts; and its sugar, 4 parts; the other 16 parts are water—but erroneously, for it is merely the result of the second fermentation, which always succeeds the vinous when pushed improperly too far. There are extremely simple and effectual methods for enabling the baker to adopt measures either to prevent or correct the evil of acescence, and these are to neutralize the acid by the use of an alkali, such as soda, or an alkaline earth, such as magnesia or chalk.

"If proper care be taken of the yeast, there is no danger of having sour dough; and if the yeast be removed to a lower temperature after the signs pointed out, the acetic fermentation never sets in.

"To make bread I set a sponge over-night. To a half pint of lukewarm water, put in a gill and a half of yeast and a pint of flour (after measuring, sift the flour), and stir this all well together, strew a little flour over the top, and cover the dish and put it in the same temperature that the yeast was in. In the morning, warm half a tea-cup of milk (if water is used, add half a tablespoonful of butter), add two tablespoonfuls of lime-water after it is warm, and stir this into the sponge; have ready a pint and a half of flour, and knead this with half a teaspoonful of salt into the sponge. Divide this into two portions, and put each into a buttered pan to rise, and when the dough rises to the top and bursts into little cracks, it is ready to bake. These loaves will bake in a common stove or range-oven, heated with coal, in thirty or thirty-five minutes. The advantages of lime-water are these: The dough requires less kneading, the loaves bake in less time, and the bread keeps soft and moist longer, and is less liable to mold, and it is healthy bread. After the bread is baked, it should be turned upside down from the pans upon a folded cloth, and left there until cool. Then it may be put into a covered tin. By following this plan, I never lose any bread from mold. In cool weather, the pans containing the dough should be placed over a vessel containing hot water, or each pan over a bowl or pitcher with hot water in it, and covered with a cloth. These loaves are generally ready to bake in two or two and a half hours.

"To make biscuit, I warm a tablespoonful of butter in half a teacupful of milk, and stir it hot on a quart of flour, let it stand and cool, and when lukewarm add a gill of yeast, a spoonful of lime-water, and a little salt, and lukewarm water to knead the whole into a smooth lump of dough; sprinkle a little flour into the bottom of the dish, lay in the dough, cover it, and when risen (which may be known by the dough's cracking and its spongy look when cut with a knife), divide the dough into equal portions and put in pans, and let them stand twenty minutes before putting to bake.

"I never use tin or metal ware of any kind to mix bread in. I prefer a wooden bowl and spoon, because they can always be kept clean and sweet. A still better thing is a yellow nappy, as it can be dipped into hot water before setting the dough in it.

"As to the use of saleratus and soda, it is only tolerated by the grossest ignorance. It is the received impression that an alkali makes the bread tender, and it is indiscriminately used, and hence so much yellow-looking bread. These alkalies are only of service when an acid is to be neutralized, and then they should be used very sparingly. It is very difficult to enlighten an ignorant cook, whose obstinacy is in proportion to her ignorance, and whose threat of leaving if not left undisturbed in her kitchen, frightens her timid, delicate mistress into silence and absence. How few mistresses there are who are able to contend with these kitchen autocrats, or are competent to prove their ability to execute what they have undertaken to teach.

"If an old housekeeper reads what has been written, she will cry out: 'La, what a fuss about bread-making, which any ninny can do!' And if she has a batch of good bread once in a fortnight, and that by good luck, as she would call it, she thinks she knows all about it, and disdains to give attention to such a trifling matter. Yet, if you ask her why her bread was not invariably good, she can not explain otherwise than that the leaven was overworked, the yeast not good, the water too hot, or the flour was bad. No wonder this question continues to agitate the world, since the world is daily doomed to dough and burnt crusts. Good bread is the exception and not the rule in more than half the families of the world."

For this reason we think that some further rules for bread-making, which come from those who always have good bread, will be acceptable. The first is from Waldo, Ohio. The writer says:

"I soak about a pint of dry hops two or three hours, or until the water foams, by which time I have boiled seven medium-sized potatoes, which I then mash, boiling hot, with a saucerful of flour, leaving the skins on; then add a quart of cold water, little at a time, mashing and mixing thoroughly after each addition of water. When lukewarm, I stir in the hop-yeast, and let it stand until morning; then I run it through a cullender, with two quarts of lukewarm water, which I add part at a time, that the ferment may be rinsed from the potato-skins. Then add two rounding tablespoonfuls of salt, and then flour until it can only be stirred with difficulty. Then I set it over a kettle of warm water in winter, or in a cool place in summer, until it is very light, when I mix it and knead it thoroughly until it will not adhere to the table or bread-bowl. When very light, knead into loaves and put it in the pans, this time kneading as little and handling as lightly as possible. When it is again light, I put it in a hot oven, bake an hour, taking care by watching not to let it burn. When done, rub the crust with a little lard, and wrap up till cold. If the yeast sours, add soda to correct acidity."

Another woman, Lynda Ball, of Clevit, Eaton County, Mich., gives her method, as follows:

"Pare and slice four common-sized potatoes, and boil them in one quart of water. When done, pour the water off into a basin, mash the potatoes and put them in the water, and when about milk-warm add one teacupful of good hop-yeast; stir in flour enough to make a thick batter, and let it stand about two hours in a warm place. Then put flour enough in your bread-bowl to make three loaves of bread; add three pints of warm water to the yeast, and stir it in the flour, and set in a warm place till it has sponged nicely; then mold, and bake one hour."

The two following are from the Granite State Health Institute:

"Indian Snow-Cake.—With one quart of meal mix two tablespoonfuls of fine dry sugar and one teaspoonful of salt. Stir into this quickly two quarts of light, clean snow. When it is well mixed, put it in a deep cake-dish, sprinkle a little snow over the top, and bake half an hour in a hot oven.

"Potato Roll.—Boil one dozen mealy potatoes, nicely peeled, covered closely in just water enough to cook them. As soon as they are tender, drain off the water if any remain, and leave them over the fire a few minutes uncovered. This is the best manner of cooking potatoes for the table, also. Mash them fine with one cup of sweet cream or new milk; rub them through a cullender into a quart of flour; then add half a tea-cup of fresh yeast, and sufficient sweet milk to make a stiff dough; keep it in a warm place until light; mold into rolls, and let it stand fifteen minutes; bake in a quick oven for half an hour."

We give another practical rule for potato bread: "The evening before you wish to bake, take six or eight potatoes, more or less, medium size, pare, boil in water till done; mash very fine, then put back into the water they were boiled in, and, when they come to a boil, have ready a pan; I prefer earthen, as that keeps warm longer, with, say, a pint of flour; pour on the scalding potatoes and water, beat well, cool with water, if thicker than buckwheat-cake batter; add, when a little more than milk-warm, half a pint or less of your bottled yeast, stir well, cover close, and set in a warm place till morning, when the mass will be perfectly light, if all the materials are good and put rightly together. Then mold out into small loaves, put in pans, cover, and set aside till they rise again; be very careful not to let them over-rise this time, or all your care is thrown away; have your oven of a moderate heat, and while baking watch carefully; the loaves ought to bake in 40 minutes or an hour, according to the size. When done, they should be a light brown; cover them up on a board kept on purpose, and by evening you will have bread that is rich and wholesome."

Another direction, from an old housekeeper, says: "Take two handfuls of hops, three pints of water, six potatoes; boil all till the potatoes are soft; pare them, mash through a cullender, strain the liquid; then put it in your preserving kettle, over the fire, with the potatoes added; also, one cup of sugar, one table-spoon of salt, one table-spoon of ginger; then add flour enough to give it the consistency of paste; let it boil five minutes, stirring it all the time. Turn out, and when partially cool, add half a pint of good yeast. Let this stand until fermentation takes place. In the winter I keep the yeast in a stone pot in the cellar, but in summer I dry it by mixing it with corn-meal, and spreading it on a table and exposing it to the air (not sun). Now we have good yeast, we will proceed immediately to make good bread. Wash and pare two dozen good-sized potatoes; boil them, with a large handful of salt, till reduced to a fine pulp; strain through a cullender, add three pints of sweet milk, and when sufficiently cool to bear your hand in it, stir in as much flour as will make it into a thick batter; to this sponge add a coffee-cup of the yeast. I always make my sponge at night. In the morning I add six quarts of sweet milk and three gills of lime-water, and knead into a stiff dough.

"Some housekeepers use alum, as it makes the bread fairer, but I prefer lime-water, as that coagulates the gluten; and it requires less baking, and retains its moisture longer—and I think it much healthier than alum, and health is the great desideratum. In two or three hours after you knead your bread, it will be as light and porous as a honeycomb; knead it down, and when it has again risen, mold, and put it into pans. Let it stand till it rises again, then wash the loaves over with cold water; this prevents the formation of too hard a crust; bake in a well-heated oven. When baked, wash again, wrapping it up closely in your bread-cloth. Wrapping the bread up in the steam till cold, prevents it from becoming hard and dry. If your flour is good, bread made in this way will be equal in appearance to the best bakers' bread, and in point of sweetness and economy, far superior. The quantities I have named make twelve good-sized loaves, and my family requires such a baking twice a week. For many years this plan has given me good bread, and I hope others will try it."

392. **How to make Good "Bakers' Bread."**—To those who would like to know how to have such bread as the city bakers make, we recommend the following formula of one that we know makes good bread, and we believe uses first-rate flour, and no deleterious mineral substances:

BAKERS' YEAST.—The following is the formula for making a tub of yeast: Four pailfuls of hot water, two quarts of malt, half a pound of hops, six pounds of flour, four quarts of yeast. The hops are boiled about five minutes, and strained. The flour is made into a paste, with hot water, before mixing in the tub. The malt and yeast are added when the water in the tub is milk-warm, and stirred briskly. It must stand from 14 to 18 hours before it is in order to use.

FERMENT.—The following is the preparation for mixing a barrel of flour: Boil one half peck of potatoes, which are to be mashed, strained, and mixed thin in water, with four pounds of flour and four quarts of yeast, and left to stand eight hours.

SETTING THE SPONGE.—A pailful of this ferment is poured into the flour in one end of the bread-trough, and mixed, with an addition of some hot water, into a soft dough, and left to stand three hours, when more water is added, and the whole mass mixed into a stiff bread-dough, and left two hours to rise, when it is ready to make out into loaves for the oven.

SALT USED.—The quantity of salt used in a barrel of flour is four quarts, and no other mineral ingredient is ever added by an honest baker. Care must be taken to use plenty of yeast, but not an excess, and that the dough is not left to rise too long. A great deal of hard manual labor is required in kneading dough, to have good bread.

393. **Brown Bread, or "Boston Bread."**—An old Yankee housewife gives

us the following valuable directions for making home-made or family bread, sometimes called—

"WHEAT AND INDIAN BREAD.—To two quarts of sifted Indian meal add hot water enough to wet the same; when sufficiently cooled, add one teaspoonful or more of salt, half a pint of yeast, and one half teacupful of molasses. Then add wheat flour enough to make it into loaves (it should be well kneaded), and when well risen, bake or steam it three or more hours; if this should get sour while rising, add a teaspoonful of sugar and a little saleratus dissolved in water.

"RYE AND INDIAN BREAD.—Take equal quantities of Indian meal and rye flour; scald the meal, and when lukewarm add the flour, with one half pint of good yeast to four quarts of the mixture, an even tablespoonful of salt, and half a cup of molasses, kneading the mixture well. This kind of bread should be softer than wheat flour bread; all the water added after scalding the meal should be lukewarm. When it has risen sufficiently, put it to bake in a brick oven or stove—the former should be hotter than for flour-bread; if in a stove oven, it should be steamed two hours, then baked one hour or more; when done, it is a dark brown. The best article for baking this kind of bread in is brown earthenware—say pans eight or ten inches in hight, and diameter about the same—grease or butter the pans, put in the mixture, then dip your hand in cold water, and smooth the loaf; after this, slash the loaf both ways with a knife, quite deep. Some let it rise a little more before they put it to bake. Many people prefer this bread made of one third rye flour, instead of one half. When it is difficult to get rye, wheat flour will answer as a substitute. It adds very much to the richness and flavor of this kind of bread to let it remain in the oven over-night."

INDIAN OR YANKEE BROWN BREAD.—Another old bread-maker gives the following information about Yankee brown bread:

"Brown bread, kneaded and made into loaves in the common way of mixing white bread, dries more quickly than the white. I obviate this difficulty thus: Take a quantity of meal, sufficient for as much bread as you wish to make at once, put it in the mixing-pan with a bowl of rising, and add sufficient lukewarm water to bring it to the consistency usually required in making johnny-cake, mixing in the same manner with a spoon, but do not stir too long, or it will not have that liveliness so desirable in good meal. It is also a much neater method, as you are not obliged to immerse your hands in the dough.

"Grease your pans, and fill not quite half full, and set it as usual to rise, which it will not be long in doing if the temperature is right. Bake one hour in a slow but steady oven. It injures a large loaf to cut while warm, though my family are very fond of it in this state, and I generally bake a loaf in a small pan to be eaten warm.

"I can assure you that bread made in this manner will keep moist for several days, and even when it does become rather dry, owing to its being light and porous, it is immediately restored by simply warming the slices slightly in the oven of your stove before eating."

We reproduce here, from a useful little book called "How to Live," which we wrote a few years since, for those who will try the economy as well as palatableness of a loaf of wheat and Indian bread, the following good receipt, long in use by our good mother and grandmother:

"To two quarts of Indian meal add boiling water enough to wet the same; when sufficiently cooled, add one teaspoonful of salt, half a pint of yeast, one teaspoonful of saleratus, one half teacupful of molasses, and flour enough to form it into a loaf (it should not be kneaded hard); when light, bake two hours in a well-heated oven. (It should be baked until brown.)"

And here is another good receipt from the same book for making rye and Indian bread, which is both cheap and wholesome:

"Stir and mix most thoroughly two quarts of Indian corn meal with a tablespoonful of salt and a quart of boiling water, or enough to wet every grain of meal. When the mush cools to milk-warm, stir in one quart of rye meal and a teacupful of good yeast, which you will first mix with half a pint of warm water, so that the yeast will be more evenly diffused. With the rye meal add water enough to make the mass a stiff dough, but not as hard or tough as flour. It must be kneaded with the hands. [*Remember—rye meal is not rye flour.* It is the unbolted product of the whole grain.] Put the dough in a pan, and pat it smooth with a wet hand. It will rise enough to bake in an hour, in a warm place, and should be put in a hot oven, and remain three hours; or if during the night, all the better. If white flour was not fashionable, or if people did not think that brown bread has a look of poverty, we should have the brown bread upon every table, for it is not only more economical, it is more nutritious and more healthy, particularly for children.

"We do not eat oatmeal in this country to any extent, and yet it is the most nutritious breadstuff ever used by man."

394. **Potatoes Used in Bread-Making.**—When potatoes bear such a price to wheat flour that, when cooked, they are about half the price per pound of the flour, it is good economy to add of potatoes about one fourth the weight that is used of flour, for a batch of bread. Bread so made is pleasanter to the taste, and equally nutritious. The potatoes should be boiled with the skins on, and then peeled, mashed, and stirred into a pulp with warm water, and rubbed through a wire sieve, and then mixed with the flour, and yeast added as for other bread. The bakers of New York understand the economy of using potatoes in their bread, whenever they are sold at low prices. The small potatoes, which are unsalable for other purposes, are often sold wholesale to bakers, and added to the flour.

The potatoes make the bread moister than it would be if composed entirely of flour, so that for those who sell their loaves by weight, the more water they can be made to contain the greater will be their profits. When about one third of the weight is composed of potatoes, it makes first-rate bread. Many persons prefer the potato-bread because it is moist, and never think how much water they are buying at sixpence a pound.

There is another use of potatoes in bread—they make it appear light, notwithstanding its specific gravity. Potatoes take on the vinous fermentation quicker than flour, and sometimes that passes into the acetous state, which the bakers correct with bicarbonate of soda, or lime-water, still adding weight without any addition of nourishment. Lime-water is not objectionable; it is only so that we should be induced to buy it at sixpence a pound, because the baker puts it in his sour flour or potato-bread, to make us think it is sweet.

Prof. Liebig advises the use of one pint of lime-water to every five pounds of flour. The lime-water should be prepared by dissolving lime in water to a point of saturation, and letting it settle and then bottling for future use. With this lime-water, use pure yeast, and you will have light, healthy bread. With saleratus, largely used, you will not have wholesome bread, disguise it as you will. In using lime-water, add it first to the flour, then add pure water and yeast, and you will have better bread than you can obtain from any preparation of carbonate of soda or cream of tartar.

Wheat, divested of all its bran, does not contain enough of all the health-giving ingredients, particularly of phosphate of lime, to satisfy the demands of nature. With such flour, potatoes are beneficial.

Bread should be more thoroughly baked than it is usually, and not eaten warm from the oven.

Dry bread should never be thrown away. By soaking and reconverting it into dough, it can be again baked into excellent bread. It is of such materials that the delicious tea-rusks are made. Dry bread also makes most delicious puddings. Bread of fine flour is too much eaten. We recommend farmers to have their wheat ground more coarsely, and only take out a portion of the bran. They may also add corn or rye meal, with advantage to economy and health. It will be also economical in the country to add potatoes. It is not always so in the city. And it is not quite honest either to sell them at the price of superfine flour bread.

For potato biscuit, grate one half dozen potatoes; add one quart of water; one cupful of hop-yeast at night; and in the morning, when light, add three teaspoonfuls of sugar, and flour to form a dough. Let it rise; when light put in tins; let it rise again, and bake one half hour.

395. **Sprouted Wheat Flour—its Effect on Bread.**—Sprouted wheat flour makes what housewives call runny dough, and that is apt to make clammy bread. To remedy this, it has been recommended to add half a gill of whisky to flour enough to make four moderate-sized loaves. But many object to the use of whisky to make bread, and ask if something else will not answer as well. We think it will. We think if about the same quantity of shortening is added to the flour that is commonly used in making the old-fashion Yankee light biscuit, that the bread will be light, fine-grained,

and free from all the difficulties usually attributed to grown wheat. The addition of a little butter or lard to any flour will not do any harm. Try it.

396. **Yeast—How to Make it.**—The chemists have proved that yeast is a plant, as much so as mold or any other fungus. As we get it fresh from the brewer, yeast appears to be a yellowish gray or fawn-colored, frothy liquid. It soon settles down and appears dead, but is still active. The taste is bitter, and it emits a rather disagreeable odor. Its effect upon all moist substances is to cause them to ferment, by a rapid increase of its growth, and a generation and diffusion through the mass of carbonic acid gas, which makes the dough puff up and assume the condition called light.

The great secret of bread-making is to use just the right quantity of yeast to produce a light loaf without having any of the flavor or odor of the yeast imparted to it, as it will if too much is used, or if the action of the yeast is not arrested at exactly the right time.

We give in No. 397 the most convenient form for preserving yeast ready for use. If liquid yeast is preferred, it can be made by mixing wheat flour and water into a paste and letting it stand two or three days in a moderately warm place, when it will begin to emit a disagreeable sour odor, which afterward passes off or changes to a vinous odor at the end of six days. Then if you have the opportunity to get malt from a brewery—and if not, you can make it by sprouting barley or Indian corn, which must then be dried and crushed—you will make an infusion of malt and boil it in water with a handful of hops, and cool it till lukewarm, and add it to the paste previously thinned into a soft batter with tepid water. This mixture kept in a warm place a few hours, begins to show activity. Fermentation has commenced, and will work the mass until there is a clear liquid on the surface, which pour off, and the opaque liquid at the bottom is good yeast, which you may keep as long as you like in winter, and in summer upon ice, or hermetically sealed in bottles till wanted for use.

A good yeast can be made, when you have the seed—that is, active yeast—from four pounds of peeled potatoes boiled in four quarts of water and a large handful of hops in a bag. The potatoes are mashed and thoroughly mixed with the water and a little salt, molasses, and flour to make a batter, to which a couple of spoonfuls of good yeast are added, and this will ferment the whole and make it fit for use as leaven for bread; it may be kept a long time in a cool place.

Yeast is sometimes preserved by dipping clean twigs in it and drying them and preserving them dry till needed, when they are soaked and the liquor added to the sponge.

It has also been dried by spreading it with a brush upon a board and repeating it as fast as each layer is dried until of considerable thickness, when it is scaled off, broken up and bottled, and sealed air-tight; it will then keep for years.

A *yeast-plant* has been found in California capable of reproduction to an indefinite degree when placed in a bottle with a little sweetened water. These plants appear somewhat like small grains of white-hulled corn soaked in water, or like the lumps of wheat flour which form in boiling, if not sufficiently stirred. A spoonful of this substance put into a quart of flour mixed for a sponge will cause it to ferment, just as an addition of ordinary yeast would. The difficulty in its use is, that it is rather liable to become too acid, but it is a pretty good substitute for common yeast in a new country where bakers and brewers are not convenient.

397. **Yeast-Cakes, or Ready-made Yeast.**—Take three ounces of good fresh hops, three and a half pounds of rye flour, seven pounds of Indian corn meal, and one gallon of water; rub the hops so as to separate them; put them into boiling water and boil half an hour; strain the liquor through a fine sieve into an earthen vessel. While hot, put in the rye flour, and when lukewarm add a pint of yeast. Next day put in the Indian meal, stirring it well, and the mess will be stiff dough. Knead it thoroughly, and roll it out to the thickness of about a third of an inch, and cut up in cakes three inches square, and dry them on a clean board or a tin in the sun. Turn them every day, let them receive no wet, and they will become as hard as ship biscuit. Store them in a bag or box, *perfectly free from damp.* When you bake, take two cakes for three loaves, and put them into a quart of tepid water with half a pint of flour in a vessel near the fire-place overnight, where they will dissolve by morning, and then use them in setting your sponge as you would the yeast of beer. These yeast-cakes may be kept just as long as you desire.

Rye flour is better than wheaten, but not absolutely essential. Some use potatoes, but a lady writes us that she finds the addition of the potatoes of no benefit and no injury, and for years has used Indian meal only—which, being simpler, makes the work easier.

To make yeast powder, take one pound of saleratus and two pounds of cream of tartar, mix them thoroughly together by passing them two or three times through a sieve. To each quart of flour add two heaping teaspoonfuls of this yeast or baking powder; wet with sweet milk or water, as usual, and bake at once in a quick oven. The bread should be in small loaves—biscuit in the same way.

398. **Saleratus-Rising for Bread.**—"In discussing this I aim at the health stand-point, and reject whatever impairs the nutritive qualities of the flour, injures its flavor, or discolors it. The excellence of bread and its lightness depend upon the disengagement of carbonic acid gas during the process of fermentation, which is the action of yeast upon the saccharine matter of the flour. Ferment or yeast is an organized matter, and its essentially operative constituent is a peculiar azotized matter, which, in the wine-vat, is mixed with some tartar and other salts, and in the beer-tun with gum and starch. Azote is found in animal bodies, and certain vegetables contain an azotized principle; indigo, caperine, gluten, and many others contain an abundance of azote. All bread-making which dispenses with kneading and

true yeast fermentation may be distrusted. The compositions of what may be termed bread compounds, even if palatable, differ greatly from true, good bread.

"It is not of what kind of eatable things bread can be made, but how to best make good, wholesome bread that is as sweet when a day or two old as when first made, or better even than when new, that has no taste of yeast, none of the bitter of hops, nor the disagreeable flavor of alkali, and that will keep good a week, if necessary.

"The preference should be given to that yeast that will make the lightest, sweetest bread, without aid from extraneous substances, that is least likely to run into the acetous fermentation without infusing the bitter of hops.

"The idea that alkalies make the bread tender is an error, the dough before their introduction having run into the mucilaginous or putrefactive fermentation."

But as many do and will continue to use alkalies, we will give some of the most approved methods.

"For making prepared flour that can be used at leisure, to each quart of flour add one teaspoonful of saleratus and two of pure cream of tartar, and what salt is required; mix them thoroughly together while dry, and set aside for use. Flour prepared in this way will last three months, for the reason, the flour keeps the chemicals separate from each other; it can then be wet up in the usual way and baked at once. Use this prepared flour for bread, biscuit, or any kind of sweet cake or pan-cakes, but do not mix the pan-cakes until you want to use them.

"The best method for making bread with sour milk and saleratus is to add to each pound or quart of flour one heaping teaspoonful of saleratus and what salt is required; mix them well together; which is best done by passing it all through a sieve. Then add as much sour milk as will make the dough the usual thickness. Mold it in small loaves, and bake at once. If the bread should be a little yellow, put in less saleratus next time. For biscuit, it should be molded quite thin. Very little shortening is required; it should be baked in a hot oven; and, if baked quick, the steam will help to raise the biscuit."

It is contended by the advocates for this bread, that "being free from all yeasty particles, it is more digestible and not so likely to create flatulence or turn acid on weak stomachs as fermented bread; and when of the finest quality, it is beneficial to those who suffer headache, acidity, flatulence, eructations, a sense of sinking in the pit of the stomach, distention, or pains after meals, and to all who are subject to gout or gravel. It is also useful in many affections of the skin.

"These remarks apply to both varieties of the bread, but especially to the brown, which is further invaluable to all who are liable to constipation from torpidity of the colon, or large intestines—the common infirmity of the sedentary—and of those who have been accustomed to oatmeal diet in their youth.

"But the advantages of the process are not limited to matters relating to health. It is valuable because bread can be prepared by it in the short space of half an hour, thus saving much time and labor. It is valuable, also, because the materials are not perishable, and may be rendered available in places and at times when yeast and other ferment is not within reach—as at sea, for example, or in country retirements; and it is still more valuable as regards economy. The cost of the chemicals is counterbalanced by that of the yeast, salt, and alum, otherwise employed; but were it not so, they would form an altogether unimportant item in the price of bread; while by their use a saving is effected in the flour of not less than 13 per cent. In the common process much of the saccharine part of the flour is lost by being converted into carbonic acid and spirit, and thus waste is incurred solely for the purpose of getting carbonic acid to raise the dough. By the new method waste is avoided, and the gas obtained in a manner equally efficacious. And it is a striking instance of the successful application of chemical philosophy to the common arts of life, for fermentation destroys a part of the flour or meal, so that 280 lbs., which make 360 lbs. of bread by fermentation, give 380 lbs. by the new process."

399. **Soda vs. Yeast, and Bread without Yeast.**—Without taking any part in the controversy about the healthiness or unhealthiness of soda bread, we will give extracts from the opinions of its advocates as follows:

"Soda is a caustic alkali in its uncombined state. It is the base of common salt. In this form it is daily taken into our stomachs with food, and also administered regularly to domestic animals by the careful husbandman. Let us remember that notwithstanding the chlorid of sodium has been used from time immemorial by man, and always eagerly sought after by wild animals, it has also met opposers among ultra hydropathists. It is therefore not so astonishing that the bicarbonate, which is what is used in cookery and of recent introduction, should find many opposers.

"Potash is an alkali extracted from wood ashes by percolation, and for culinary purposes is combined with two equivalents of carbonic acid, and sold under the name of saleratus. The chemical natures and physiological effects of the two bicarbonates are so nearly identical that I shall not keep up the distinction in treating of them, though from the fact that the bicarbonate of soda is dryer and more easily reduced to powder, it is preferable.

"To secure the desired effect of bicarbonate of soda, it is necessary to use it in connection with some acid which, by combining with the alkali, sets free the carbonic acid, in form of gas, at the time of baking. Sour milk, which contains lactic acid, is best. The lactic acid, having a stronger affinity for the soda than the carbonic acid has, combines with it, forming lactate of soda, a neutral salt, possessed of no caustic property whatever; while the gas, disengaged, fills the bread with minute cells and thus renders it light and palatable.

"In the absence of sour milk, tartaric acid or cream of tartar should be used. If tartaric acid is used, tartrate of soda results; a harmless substance even in considerable quantities, and by no means unpleasant to take in warm days in the form of an effervescing draught. If cream of tartar is used, the product is tartrate of soda and potassa, or Rochelle salts, which, in ounce doses, is known to be one of our mildest saline purgatives.

"A hearty eater will take only a few grains of any of these salts at a meal, and these readily pass off through the excretions of the body, or enter upon their physiological offices in the gastric fluids—the bile or blood.

"These bicarbonates, used without an acid, render bread unpalatable; and this of itself would prevent persons from using them to a hurtful extent.

"Instead of being a curse to the world, the introduction of the bicarbonate of soda has been a great blessing in banishing lard, in a great measure, from our biscuit. That the large quantity of grease necessary to make good short biscuit of superfine flour renders bread in a high degree indigestible, will be universally admitted. Make biscuit according to the following formula, and you have an article altogether superior in point of digestibility and flavor to those in which lard is used as the only shortening.

"*Rule* 1. Flour, two pounds; fine Indian meal, a teacupful; bicarbonate of soda, a heaping teaspoonful. Thoroughly mix these *dry*, and make up with new buttermilk, or if the milk is very sour, add water sufficiently to make it about like new buttermilk. The soda must be neutralized, and, in using milk, judgment on this point must be exercised.

"*Rule* 2. Flour and meal as above; rub together dry a teaspoonful of soda and two thirds as much tartaric acid. Mix this dry with the meal and flour, and make up with water.

"*Rule* 3. Same as No. 2, except use a teasooonful of cream of tartar instead of the tartaric acid.

"A very small quantity of lard or butter may be used with advantage to the taste, but it is not essential. These ingredients added to corn bread make a wonderful improvement on the old-fashioned hoe-cake. That this bread is healthier than yeast bread there is no doubt.

"A healthy stomach, especially in winter, when the system is in a vigorous condition, may take yeast in considerable quantity and digest the meal before the process of fermentation has time to take place. But not so with weak stomachs, or healthy ones in the heat of summer, because yeast is the deposit formed in fermenting liquids, and has the property, when added to solutions of starch or sugar, even in exceedingly small quantities, of exciting the vinous fermentation in the whole mass, and may, and often does, do it, in the stomach as well as in bread."

But the sweetest, most nutritious, most wholesome bakers' bread, we believe, that ever was made, is that first brought into general use in New York in 1861, by the establishment of a large manufactory for its production, which used over forty barrels a day, when working in full force. This bread is called "unfermented," yet it is as light as any good home-made bread, which it very much resembles.

The following is the process by which it is made light without yeast:

"The best superfine flour, with a due proportion of pure water, passes from the bin, through a large iron pipe, into a huge, hollow globe of cast-iron, lined with tin, in which revolves an iron shaft with polished steel arms, which mix and knead the dough.

"During this operation pure carbonic acid gas is conveyed from the gasometer into the globe by a powerful force-pump, and is incorporated uniformly into the whole mass. Every ingredient is in definite proportion, and the most perfect accuracy is thus insured. By the pressure of the gas the dough is then forced through a valve into baking-tins, and in an hour and a half, from flour in the bin, it is beautifully baked bread. No hand of man touches it in the whole process. All is done by the iron hands of machinery and the power of steam. No chemical change whatever occurs in the flour. All its elements—the starch, the gluten, and sugar—are retained in their original proportions and purity, and the result is the best and sweetest bread in existence. By the old process a little of the starch is always converted into dextrine—a species of glue—giving the bread a dark color, and sometimes sodden texture. To remedy this, *alum* is generally used, and the bread thereby further vitiated. Perfect cleanliness in the manufacture of bread has not been possible heretofore. It is by this process.

"Bread made at home has been the purest that could be had, for the vessels were carefully looked after, and the air was generally free from dust and decomposing particles, but none could tell what impurities contaminated the yeast, which, whether it came from baker or brewer, was necessarily more or less mixed with foreign substances. Home-made bread was the cleanest we could have, but was not perfectly pure; while with the most watchful supervision and most careful cleanliness, bakers' bread, made in the ordinary way, can not possibly be entirely clean."

Another advantage unfermented bread has over all other bakers' bread, is its remarkable keeping quality. It has been eaten with great satisfaction when twelve days old.

William Lounsberry, commissary of the 20th Regiment, New York State, which had been served with this bread while in the city and on the march to Washington, speaks of it in the following terms:

"The bread has been on our table every day since we left, and is considered by all a great delicacy. It loses none of its flavor by its age, but, for me, it really seems to improve.

"It is sweet, light, and very palatable. I consider it, in many respects, the best bread I ever tasted, in addition to its power of retaining its excellence so long, the virtue which gives it its inestimable value. I wish I could be the means of informing a much larger number than I am able of its inestimable merits."

We have spoken of this method of making bread, not because it will help families to make better bread, but to show what improvements have been devised to make bread upon a large scale. The process would be a good one for the army and navy, and in all large towns. It is proper to say, however, that the bread is not a universal favorite. Habit so vitiates the taste, that there are people who love sour bread, and also bread that smells and tastes rank of yeast. To us it is not agreeable nor healthy. This "unfermented bread" is patented by Elisha Fitzgerald and James Perry, New York.

400. **Other Substitutes for Yeast—Chemicals in Bread.**—A substitute for cream of tartar has been discovered by Prof. E. N. Horsford, which he thinks far preferable to use with soda in bread. He says of it:

"All these considerations led me to the conviction that, if it were possible to prepare phosphoric acid in some form of acid phosphate of lime, such that, after its action with moist carbonate of soda, it would leave phosphate of soda (a constituent of the blood) and phosphate of lime (an essential constituent of food), and confer upon it the necessary qualities of a dry, pulverulent acid, the end would be so far attained as to justify a practical experiment in domestic use.

"I succeeded in producing an article in condition to meet the wants of the problem. I then introduced it into my family for use in all forms, as a substitute for cream of tartar for culinary purposes. When many months of daily use had assured me that my theoretical views were sustained by practical application, I gave it into the hands of friends, whose prolonged experience fully confirmed my own. It has been in constant use in my family now for more than four years; and in the form of yeast powder, during this time, it has been produced and consumed in all parts of the country to a very large extent, settling, in the most satisfactory manner, all questions as to its serviceability and healthfulness.

"The article is prepared according to instructions furnished by myself, as the result of long-continued experiment, and it will be produced of invariable purity and strength equal to that of cream of tartar."

Of the same purport, and having a direct reference to this case, are the views of Dr. Samuel Jackson, professor of the institute of medicine in the University of Pennsylvania:

"Your substitute for cream of tartar for the raising of bread is a decided improvement. The tartaric acid is not a constituent of the grains from which flour is made; it is not a nutritive principle, and often disagrees with the alimentary organs. The phosphate of lime, which is the principal ingredient of your preparation, is an essential constituent of all grains. It is further an important nutritive principle; and recent experiments have proved it is an indispensable element in the formation, not of bones only, but of all the animal tissues. A deficiency of the phosphate of lime in food is a common cause of ill-health, of defective development, and retarded growth in children. In the conversion of wheat into flour, the phosphate of lime is rejected with the bran; and, in consequence, this necessary element of nutrition, contrary to the arrangement of nature, is not obtained from our fine wheat bread. Your preparation, while it makes a light, sweet, and palatable bread, restores to it the phosphate of lime which has been separated from the flour, and thus adapts it as an aliment for the maintenance of a healthy state of the organization."

Other chemists and physicians of acknowledged high character and standing have given similar opinions.

If raising bread by yeast is properly conducted, it is quite unobjectionable; but if, as is often the case, fermentation is allowed to proceed too long, acetic and lactic acids are formed, and some of the complex nitrogenous substances arise from the decomposition of the plastic bodies of the flour, and are incorporated in the bread.

Yeast bread is never good unless the fermentation is arrested by baking at just the right time. Ordinarily, this right time is a period of short duration, and probably not one loaf in one hundred is raised and baked when it should be. The circumstances which modify the time in which the fermentation may take place are so various, that it may occur in thirty minutes or twelve hours. The sponge requires constant watching, and this, in the multitudinous duties of the kitchen, it is not always possible to secure. Then saleratus or soda, to sweeten the sour sponge, is the resort of the cook; and the result is an unpalatable and unwholesome loaf, unworthy the name of bread, and is really unwholesome food.

A correspondent of the *Country Gentleman* recommends the following formula for unfermented bread:

"Take of flour 3 lbs., bicarbonate of soda 9 drachms, hydrochloric acid, specific gravity 1.16, 11 drachms. About 25 oz. of water will be required to form the dough. First mix the soda and flour as thoroughly as possible; which is best done by shaking the soda in fine powder from a sieve over the flour with one hand, while the flour is stirred with the other, and then passing the mixture once or more through the sieve. Next pour the acid into the water and diffuse it by stirring them well together, avoiding the use of any metallic utensil that the soda might come in contact with. Then mix the dough and water so prepared as speedily as possible. The dough should be speedily put into a quick oven. This manner of making bread is a great improvement, and will prove advantageous, compared with the fermenting method, and the quality also will be found vastly superior to the antique 'leavened bread,' particularly for dyspeptics, as it has this advantage, that it never sours on the stomach. By this method bread can be made in two hours, and it saves both time and labor. The ingredients are simple, and cost little. Fermentation always destroys more or less of the flour, besides otherwise injuring it for the purposes of assimilation.

"A large proportion of the bread used in some families is scarcely more than an active form of yeast, which produces in the stomach a new fermentation and a host of disorders. And then we witness, of course, the blue vapors, which under different aspects are as ruinous to the welfare and peace of a family as are those of a distillery. If the proportions of acid and baking soda directed to be used are thought to be too great, they may be varied at discretion.

"In bread-making the only purpose served by fermentation is the generation of carbonic acid to raise the dough, and to effect this a quantity of yeast is mixed with the flour. But the same purpose is gained by mixing a quantity of carbonate of soda with the flour, with a corresponding proportion of hydrochloric or muriatic acid, and bread so formed is more nutritious and economical."

Common salt always should be added, not only because it is palatable, but because it has a chemical effect upon the flour, so that that of inferior quality assumes an appearance above the reality. This is proved in what is called "*salt-rising bread*," which always looks whiter than the same flour made with yeast. Salt also has the effect to make flour take up and retain more water in the bread. Alum has the same effect as salt in a stronger degree, and its use by bakers is dishonest, because it is much more deleterious than salt to the human stomach.

Sulphate of copper is another deleterious article in bread, but it can only be used in small quantities, without great danger, and produces the same results as alum in a still greater degree.

Carbonate of magnesia, used at the rate of 20 to 40 grs. to the pound of flour, produces effects similar to the alum or sulphate of copper, and good scientific authority has pronounced it harmless, or at least preferable to soda. Other authority says its inaptitude to become entirely soluble makes it highly objectionable.

Probably the safest mineral substance that can be used in bread is lime, as recommended by Liebig (394).

To prepare this lime-water, mix a quarter of a pound of slaked lime in a gallon of pure, soft water or filtered rain-water, and cork it tight in bottles. The water will dissolve $\frac{1}{700}$th of its weight of the lime, and the balance will settle to the bottom, leaving the water transparent, which may be used at the rate of 5 lbs. to 19 lbs. of flour, and then fresh water may be added to the lime until all that is soluble is used up. The quantity of lime taken into the system is so minute that it is believed that it is not only not deleterious, but positively beneficial.

401. **Prof. Youmans' Opinion of Chemicals in Bread.**—Speaking of the use of various chemical substances for yeast, Prof. Youmans says:

"The class of substances thus introduced in the bread are not nutritive but medicinal, and exert a disturbing action upon the healthy organism. And although their occasional and cautious employment may perhaps be tolerated on the ground of convenience, yet we consider their habitual use as highly injudicious and unwise. This is the best that can be said of the chemical substances used to raise bread, even when pure; but as commonly obtained, they are apt to be contaminated with impurities more objectionable still. For example, the commercial muriatic acid which is commonly employed along with bicarbonate of soda, is always quite impure, often containing chlorine, chlorid of iron, sulphurous acid, and even arsenic, so that the chemist never uses it without a tedious process of purification for his purposes, which are of far less importance than its employment in diet. While common hydrochloric acid sells for three cents per pound wholesale, the purified article is sold for thirty-five. Tartaric acid is apt to contain lime, and is frequently adulterated with cream of tartar, which is sold at half the price, and greatly reduces its efficacy; while cream of tartar is variously mixed with alum, chalk, bisulphate of potash, tartrate of lime, and even sand. Sesquicarbonate of ammonia is liable by exposure to the air to lose a portion of its ammonia. It is hence seen that the substances we employ are not only liable to injure by ingredients which they may conceal, but that their irregular composition must often, more or less, defeat the end for which they are intended. We may suggest that in the absence of tests, the best practical defense is to purchase these materials of the druggist rather than the grocer. If soda is desired, call for the bicarbonate of soda; it contains a double charge of carbonic acid, and is purest. Soda-saleratus is only the crude, impure carbonate—soda ash. The cream of tartar should appear white and pure, and not of a yellowish tinge. Carbonate of potash in its crude state appears as pearlash; in its more purified form it is saleratus. Crude soda is known as sal-soda or soda-saleratus; refined and cleared of its chief impurities, it forms carbonate and bicarbonate of soda. All these compounds have the common alkaline or burning property, which belongs to free potash and soda, which is lowered or weakened by the carbonic acid united with them. The potash compounds are the strongest, those of soda being of the same nature, but weaker. Yet the system, as we have just seen, recognizes essential differences between them; one pertains to the blood and the other to the flesh. According to the theory of their general use for raising bread, they ought to be neutralized by an acid, muriatic, tartaric, acetic, or lactic, thus losing their peculiar properties and becoming salts. These changes do take place to a certain extent, and the saline compounds formed are much less powerful and noxious than the unneutralized alkalies; their effects are moderately laxative. Yet, in the common use of these substances, as we have stated, the alkali is not all extinguished; much of it enters the system in its active form. Pure, strong potash is a powerful corrosive poison, disorganizing the stomach and dissolving its way through its coats quicker, perhaps, than any other poisonous agent. When the alkalies are taken in small quantities, as when there is an excess in bread, they disturb healthy digestion in the stomach by neutralizing its necessary acids. They are sometimes found agreeable as palliatives when there is undue acidity of the stomach; and, on the other hand, they may be of service in the digestion and absorption of fatty substances. It is alleged that their continued use tends to reduce the proportion of fibrin in the blood. Cases are stated where families have been poisoned by the excessive employment of saleratus."

402. **Baking Bread—Heat of the Oven—Quality of Flour.**—The heat of the oven, besides being equally diffused, should continue regular. The heat is right when flour sprinkled on the oven-bottom turns brown gradually, and

too hot if the flour chars black directly; for then it will produce a thick crust, often burnt, while the interior of the loaf is underdone. The crumb is cooked at the boiling-point—212 degrees—and might be done in a steam-chamber as well as an oven, but for the crust, which we all love so well that we are not willing to dispense with it for any more economical mode of cooking than the oven.

The heat of the oven swells a well-raised lump of dough to about double the size by the expansion of carbonic acid gas, and by steam arising from the moisture in the loaf, and by the vaporizing of alcohol, distilled out in the process of baking, to an amount equal to about one quarter of one per cent. of the weight of bread. A well-raised loaf of bread is more than half cavities. The loss of weight in baking depends upon the quality of the flour and size of the loaf. A one-pound loaf will generally require 1 lb. 6 oz. of dough. A three-pound loaf requires 3 lbs. 12 oz of dough. A six-pound loaf requires 7 lbs. of dough. This shows that it is the most economical to bake large loaves.

If you wish to prevent baking a hard crust, you can do so by rubbing the loaf, after it is shaped for the oven, with a little lard, just enough to varnish the surface. The crust, however, if not burnt, is always eaten with satisfaction, its agreeable bitter taste being preferred by many persons.

The crust, which is dry and crisp upon new bread, grows soft and moist after a day or two. Some housewives always wrap their loaves in wet cloths when taken from the oven, to prevent the crust from continuing to get dryer. There is no need of this, because the moisture of the crumb soon softens the crust, and frequently leaves the crumb too dry. When this is the case, return the stale loaf to the oven in company with a dish of hot water.

The average quantity of water in well-baked wheaten loaves is about forty-five per cent. The best flour contains six to ten per cent. of water. The reason that spring wheat flour makes moister bread than winter wheat, is because it contains more gluten, and that being once thoroughly wet in mixing the dough, is retentive of the water, even after it has lost its tough, adhesive qualities, in passing from dough into well-baked bread crumb. A portion of the starch of the dough also retains water by being converted by the baking process into gum. The loaf will retain much more moisture, and consequently be better bread, if it crusts over immediately upon its being placed in the oven, as it is then in a measure impervious to water, and shuts in all that the interior of the loaf contains.

403. **The Effect of Kneading.**—Good bread can not be made by merely mixing flour and water and yeast. The mass must be kneaded so as to be sure to bring every grain of flour in contact with its equivalent grain of water, and so as to diffuse the yeast uniformly throughout the mass, or else the resulting gas will be liberated in excess in one spot and not at all in another. This is seen in badly-kneaded loaves in the large holes they contain, and in a crust that easily detaches from the crumb, as though it had been lifted up by internal force. The air-cells in a well-kneaded loaf are

fine and uniform throughout the mass, and all will be formed at about the same time. If the flour and yeast are decidedly good, and the kneading decidedly bad, the bread will not give satisfaction. On the other hand, good kneading, good molding, and good baking, will make a second or third-rate quality of flour pass almost equal to the best.

404. **Preparations of Wheat and Other Substances for Bread.**—There are many things which may be used to mix with white wheat flour, or as substitutes for it. A baker in Paris has tried a successful experiment to reduce the cost of bread by mixing rice flour with that of wheat. He puts in one part of rice to five of wheat flour, and the economy effected reaches the very considerable figure of one sou in the two-pound loaf. The government has had the bread examined by competent persons, and has authorized the sale of it at a less rate than fixed by the police. The demand is such that the baker can not supply it. Neither the nutriment nor the taste of the bread would appear to be affected by the presence of the new ingredient.

The greatest advantage of mixing rice flour with wheat flour is to enable the loaf to retain more water, and make a moister bread.

Bread made of wheat meal, as is proved by the chemical experiments of Prof. Johnston, affords much more nutriment than that made from superfine flour. These experiments show us that 1,000 lbs. of wheat meal, or the wheat ground coarsely, and the hulls or bran portion sifted out by using a common meal-sieve, contain the elements of—Muscular matter, 156 lbs.; fat, 28 lbs.; bone material, 170–354 lbs.

Whereas in fine flour are found only of—Muscular matter, 130 lbs.; fat, 20 lbs.; bone material, 60–210 lbs. Leaving a balance in favor of the former of 144 lbs. in 1,000 lbs. of the real elements of food convertible by assimilation into muscular flesh, fat, and bone.

Now, as bread ranks among the chief, if not as the chief substance designed for the nutrition and support of the human frame, the above facts ought to have weight, in a pecuniary point of view, as an argument against the exclusive use of superfine flour.

Unbolted wheat meal for bread is in high favor with many, and we think every family should use it a portion of the time. In mixing the dough of this meal, do not make it quite as stiff as you would white flour, and you must be careful that it does not sour in rising, as it will do so sooner than bolted flour. It also requires a hotter oven and longer baking, and the crust is more apt to burn.

Rye flour mixed with wheat flour enables the loaf to hold more water. The objection to it is its darker color and rye taste.

Indian corn meal is also mixed with wheat flour, for the same purpose as rye flour, and if pure white corn is used, it does not affect the color of the loaf, and makes very sweet bread.

Of mixing potatoes we have fully treated (394), and recommend farmers to grow some of the very white fleshed, dry sorts, for this purpose.

A French process uses ninety per cent. of the wheat making white bread.

The wheat is ground into fine wheat flour, seventy-four per cent.; brown meal, sixteen per cent.; bran, ten per cent. The meal is then mixed quite thin with water and the necessary yeast added, and this is used to mix the white flour into a dough, which is baked as usual when light. The bread is declared to be greatly improved, being less likely to sour, and is light, sweet, and nutritious,

405. **Corn Bread.**—Although Indian corn is a more universal crop than wheat, corn bread is by no means in universal use. The reason is in some measure to be accounted for in the inborn love of fermented bread which the meal of this grain will not make. The use of "leavened bread" has been thought by some to come in part from the early notion that it created a distinction between Christians and Jews. The former always use leavened bread—at least the Protestants do, in their sacraments—and the Jews have their holy "feasts of unleavened bread;" so that eating unleavened bread as a constant practice has been said to be an unchristian act. It was also the daily food of the heathen, and in early times, when the first settlers of the country were very poor, corn bread was the only kind; and the use of it now may call up reminiscences of painful poverty. It is also the only bread of slaves, and it may be looked upon as a badge of servitude. At any rate, the poorest classes of the Northern States make the least use of corn bread. Yet it is the very thing that they should eat, because it is nutritious, healthful, and economical. In Northern cities, corn meal furnishes scarcely one per cent. of the bread food, and not one per cent. of that is made into bread. In the farming regions of the northeastern States pure corn bread is only seen occasionally upon the farmer's table, though bread made of a mixture of about two parts of corn meal and one of rye meal, familiarly known as "ry'n'-injun," is still extensively used. (See 393.)

A much better mixture is one part rye meal, two parts corn meal, and four parts fine wheat flour. The rye and corn are mixed with yeast, quite soft, and set to rise, and after getting very spongy, the wheat flour is worked in, and the mass allowed to get light before it is put to bake.

At the South, corn bread is almost the only sort ever seen upon the tables of many families who rank upon a par with the mass of Northern farmers. All eat it there and are content, both master and slave, and those who are hired, or sit at the table as guests. If a farmer at the North should attempt to feed his laborers exclusively upon corn bread, there would probably be a revolt, particularly if a majority of them were Irish, whose only bread in their own country was potatoes.

Such laborers have yet to learn that corn bread gives more working force than bread of fine wheaten flour. The latter gives the most brain food, and is best for growing children; but Indian corn, either in the form of bread, or many of the other forms in which it comes to the tables of those who know how to cook it, furnishes the laborer with a greater proportion of power than any other grain, and its value should be better known, and it then would be more used as an article of food.

Perhaps the reason why the use of corn bread is going out of fashion in this region, which is in the very center of the great corn belt, may be found in the fact that so many households are now served by cooks who were not born in a corn-growing country, and who seem incapable of learning that corn meal is not fit to eat in a semi-raw state. If they make it into mush, they only scald it. If they mix it into bread, they insist upon its being done as soon as it is heated through. Learn, then, that corn meal can not be cooked too much—it seldom is enough. The best corn bread we ever ate was from meal well kneaded with nothing but water and a little salt, and then made into lumps about the size and somewhat the shape of a man's foot, and raked in the embers just like potatoes to roast, and there allowed to remain and cook all night. The next best corn bread is the old-style johnny-cake, mixed in the same way, and patted about three-quarters of an inch thick upon a board, and roasted before an exceedingly hot fire.

The next best are the "corn-dodgers" of the Southwest, mixed like the first, and baked in an iron bake-pan, standing on hot coals, with hot coals on the lid. These dodgers are usually of two to four pounds weight, and when brought hot to the table are certainly good bread. They are much eaten cold, but we can not recommend them in that condition, only as being infinitely better than the half-baked corn bread common at the North.

All the improvements of corn bread ever attempted by adding other ingredients have failed, to our taste, to produce an article equal to a well-baked ash-cake or corn-dodger.

Remember the three grand secrets about making good corn bread: never to grind your meal very fine, always to have it fresh ground, and never fear baking it too much. All corn bread should be cooked a long time. The negroes often bury the dough in the hot embers all night.

One of the most common objections to the use of corn bread is its supposed indigestibility. On account of this character, which it has obtained, as we think, unjustly, it is avoided by many people who are of a dyspeptic habit. We think there is a mistake in ascribing this character to corn bread indiscriminately. If Indian corn meal is not thoroughly cooked, it is indigestible—more so, perhaps, than any other grain. But such bread as that above described as ash-cakes or corn-dodgers, we do not believe indigestible. We have often eaten corn-cakes, made purposely for a severe affliction of indigestion, and found them better than any other kind of bread. These were made of meal and water and salt only, and patted out into the size and thickness of Boston crackers, and most thoroughly baked in a quick oven. See Section XXIV.

SECTION XXIV.—SUBSTITUTES FOR BREAD, IN GREEN AND DRIED CORN, POP-CORN, HOMINY, AND PREPARATIONS OF WHEAT

HOW truly has bread been denominated "the staff of life!" For it there is no substitute; though some of the excellent preparations of food treated of in this section may be considered substitutes, but they are only partially so; yet they are worthy of our especial attention, because, as articles of food, all over America, they hold a high rank; and a notice of them seems fitting in connection with the bread question. Each one of the articles named in this section furnishes wholesome and economical food, and some of them should be better known in every farmer's family.

406. **Green Corn, or Roasting Ears.**—Roasting the ears, is the primitive way of using Indian corn. It is the first use that the early settlers of America made of it, because that was the mode in which they found the Indians preparing it. The quality of the corn grown for eating while in its milky state, has been much improved since Captain Smith took his first meal with Pocahontas, on the banks of James River, in 1607. Certainly there can be no richer vegetable food than the best quality of sugar corn, such as every farmer should grow, when simply boiled, or when made up in that Indian dish called succo-tash. And if any farmer doubts the value of this green corn, as winter food, when carefully preserved by drying, or in sealed cans, we think he would be convinced, if he could dine at our table for a month in midwinter, where he would find it was one of the regular dishes. We have just made a hearty meal of this and another preparation of corn, directly to be noticed. It is almost a substitute for bread and meat. It is useless to advise any native American farmer's family to eat green corn, but it is not useless nor improper to urge nine tenths of them to use a better variety. And we do most earnestly ask every family to preserve enough by drying to give the family a dish of it two or three times a week, cooked by boiling in plain soft water two or three hours, and until nearly all the water is absorbed or evaporated, and then season with salt and butter. If a little saleratus is added at first, it will become tender with less boiling. Some like it dished up with milk or cream. It is also excellent stewed with beans (succotash), seasoned with a piece of meat, and it is very good in soups.

407. **How to Dry and Cook Sweet Corn.**—When the corn is in good condition for eating, the grains being fully grown, boil a quantity of ears just enough to cook the starch, and let them cool and dry a few hours, and then shell or

cut off the grains and spread them in the sun till dried. The best way to dry the corn is to nail a piece of cloth of very open texture on a frame; say two feet wide and five feet long, will be a convenient size to handle. If the corn is spread thinly upon this cloth it will dry quickly without souring. It should be covered with a piece of musquito netting to keep off the flies. Another person gives the following directions for drying sweet corn.

"As soon as the corn is fit for the table, husk and spread the ears in an open oven or some quick drying-place. When the kernels loosen, shell the corn as soon as you can, and spread it upon a cloth to dry in the sun, or on paper in a warm oven; stir it often that it may dry quickly and not overheat. Dried in this way, the kernels remain whole, are sweeter, and retain more of the natural flavor by drying faster. When all dried, expose it to the wind by turning it slowly from dish to dish; the wind blows off all that troublesome white chaff."

Another plan has been highly recommended and a machine invented to facilitate the operation; this is to bore out the pith of the cob and then completely dry the corn on the cob and keep it there till wanted for the table, when it may be shelled first or boiled as it grew.

Directions for cooking dried sweet corn are very simple. Wash and put it in warm water to soak several hours; then in the same water boil it for a half hour. Just before taking it up, add some sweet milk or cream, pepper and salt to the taste, and a little sugar if it is not as sweet as would be agreeable. Sometimes a bit of soda as large as a pea in a half pint of corn, while soaking, makes it more tender, and corrects any stale taste which it has acquired by long keeping.

This is a good dish with meat, dressed with gravy, or it may be eaten with sauce as a dessert dish. It is good enough, eaten any way, to be, and it should be, upon every American farmer's table.

408. **Hulled Corn, or Lye Hominy,** is another primitive form of preparing an excellent substitute for bread. In the form of "tortillas," it is the almost universal bread of Central America. We look upon hulled corn as one of the luxuries of American farm life, yet not one in ten of farmers' families ever enjoy it. It is particularly acceptable in the spring of the year, when old vegetables are on the decline, and new ones have not yet come into use. When the farmer burns wood, a white lye may be made in a few minutes, or cobs may be burned and ashes used to make a lye, into which put the corn to be hulled, which should be large, white-flint corn, and let it remain until the hull will slip easily, and then rinse it thoroughly in cold water, rubbing it with the hands or stirring it with a stick till all the hulls are washed off. Feed the hulls and chits which come out to the pigs or hens, and boil the corn for yourself until it swells to three times its original size, and is as soft as bread. You may prepare and boil a gallon at once for six persons, and what is not eaten at first may be warmed over just as you would potatoes. Those who have no wood ashes or cobs to make weak lye of, may hull corn by using a teaspoonful of saleratus to a quart of corn, in water enough to

cover it. In either case the lye must be made hot after the corn is put in to loosen the hull; and if the lye is not carefully washed from the corn, it will taste unpleasantly.

409. **Samp, or Dry Hominy.**—This is another and most valuable preparation of corn, and an excellent, wholesome, economical substitute for bread. It is an article that no family, desirous of practicing economy, can do without. It is a very cheap, healthy, nutritious food. It usually costs only half the price per pound of flour, and contains no moisture, while the best of flour holds from twelve to sixteen pounds of water in a barrel. In point of economy as human food, one bushel of hominy is equal to ten of potatoes, for which it is an excellent substitute, and is almost as universally liked as potatoes, and at the South it is more freely eaten; while at the North it is seldom seen, except by a few persons in cities. By hominy, we do not mean a sort of coarse meal, but grains of white corn from which the hull and chit or eye have been removed by moistening and pounding in a wooden mortar, or patent hulling machine, leaving the grains almost whole, and composed of little else but starch.

410. **How to Cook Hominy.**—The process is very simple to those who know how. As but few do, we give the formula of practice in our own family: Wash slightly in cold water, and soak twelve hours in tepid, soft water; then boil slowly from three to six hours in the same water, with plenty more added from time to time, taking care to prevent burning. Do not salt while cooking, as salt or hard water will harden the corn; so it will peas or beans, green or dry, and rice also. When done, add butter and salt; or a better way is to let each one season to suit the taste. It may be eaten with meat in lieu of vegetables, or with sugar or syrup. It is good, hot or cold; it is good frequently warmed over, for it is like the old-fashioned pot of—

> "Bean porridge hot, or bean porridge cold,
> Bean porridge best at nine days old."

So is hominy; it is good always, and very wholesome, and like tomatoes, only requires to be eaten once or twice to fix the taste in its favor.

In New York this article is called samp, and the name hominy is given to corn cracked in a mill, and winnowed, and sifted, and numbered according to its fineness. We add a few of the ways in which hominy may be used.

Hominy Breakfast-Cakes.—Mash the cold hominy with a rolling-pin, and add a little flour-and-milk batter, so as to make the whole thick enough to form into little cakes in the hand, or it may be put upon the griddle with a spoon. Bake brown, eat hot, and you will declare you never ate anything better of the batter-cake kind.

Hominy Pudding.—Prepare as for breakfast-cakes; add one egg to each pint, some whole cinnamon, sugar to suit the taste, and a few raisins, and bake like rice-pudding. A little butter or chopped suet may be added. Serve hot or cold, with or without sauce.

Hominy Salad.—To a pint of cold hominy add a small onion, a quarter of a boiled chicken, or about the same quantity of lobster, chopped fine, to which some add a small pickle. To be dressed with sweet oil, mustard, pepper, and vinegar. It is a very good substitute for green salads at seasons when the latter can not be obtained.

HOMINY AND MILK, hot or cold, is as much better than mush-and-milk as that is better than rye-meal porridge.

HOMINY AND BEANS.—Mix equal parts of cold baked beans and hominy together, and heat up, and you will have an excellent dish.

SOFT HOMINY BREAD.—One spoonful of boiled hominy, cooled; a small lump of butter, one egg, half a pint of wheat flour—mixed with milk to the consistency of cream. Bake a half hour in a hot oven.

HOMINY WAFFLES.—Two spoonfuls of hominy, a small lump of butter, two eggs, one quart of wheat flour. Thin with milk to the consistency of very thick cream. Bake in waffle-irons.

411. **How Hominy is Made.**—The primitive way of making hominy was beating the corn in a mortar, in a considerable mass together, so as to rub off the hulls by attrition of the grains, without breaking them. Nearly forty years ago, in floating down the Ohio River of a still evening, we first heard the music of the hominy mortars, which filled the air, as the voices of the negroes kept time to the strokes of the pestles, preparing a favorite food for their masters as well as themselves. But of late years the ground hominy, or cracked corn, has in a great measure driven the old hominy mortar out of use. Negro hominy is cooked by soaking and boiling until it becomes gelatinous, and then, when cold, if cut in slices and fried in a little fat, is often eaten in preference to any other bread. Hominy is also made by mechanical means, one of which is a shaft armed with files, revolving in a case with the corn, which makes a very nice article.

At the South, negroes prefer hominy or corn meal to wheat flour, pound for pound. Corn is ground very coarse, and frequently eaten, hulls and all, in preference to sifting. Few would be willing to live upon that alone. It would not be good economy to do so. It would be good economy for us all to use more Indian corn meal, and it would not only be economical, but healthy, to eat more hominy.

We will add here several good receipts for cooking corn meal, as substitutes for wheaten bread:

412. **Virginia Corn Bread.**—Dissolve one tablespoonful of butter in three and a half pints of boiling milk; in this scald one quart of Indian meal; when cool, add a half pint of wheat flour, a little sugar, a teaspoonful of salt, and two eggs well beaten; mix well together, and bake in two cake-tins well greased or buttered.

413. **The St. Charles Hotel Indian Bread.**—Beat two eggs very light, mix them with one pint of sour milk (or butter with sweet milk will do), then add a teaspoonful of soda or saleratus, then stir in slowly one pint of Indian meal and one tablespoonful of melted butter; beat these well together; bake in a common cake-pan, in a quick oven. The bread can be made very good without eggs.

414. **Mush, or Hasty Pudding.**—Stir into a half pint of cold water enough Indian meal to make a thick batter; put this into three or four quarts of boiling water over the fire; after this has boiled ten minutes, stir in a dessert-spoonful of salt, and sifted meal until it is quite thick; let it boil from one to two hours, stirring it often to prevent its burning.

415. **Fried Mush.**—Mush to be fried should boil a little stiffer, with a half pint of flour, say, to two quarts of mush; put the mush in an earthen dish dipped in cold water; let it stand until perfectly cold; then cut it in slices half an inch thick, and fry them brown on both sides in a little butter or pork fat—lard will do with a little salt.

416. **Indian Cakes.**—To a pint of mush add milk or warm water to make a batter, and flour enough to make the cake hold together; two or three eggs, two spoonfuls of molasses or sugar, a little nutmeg or lemon, to suit the taste; bake on a griddle or in an oven.

417. **Baked Indian Pudding.**—Into one quart of boiling milk scald ten tablespoonfuls of Indian meal; when cold, add a teacupful of molasses, a piece of butter the size of an egg, a teaspoonful of salt, also of ginger and cinnamon; bake in a pudding-dish from one to two hours, in a cook-stove, or longer if in a brick oven. When done it has the appearance of brown bread.

418. **Pop-Corn—Its Uses as Food—It makes Delicious Puddings.**—We can not close this section upon substitutes for bread without bringing to the notice of farmers a new preparation of Indian corn, original with the author, but highly approved by a very large number of persons to whom the new discovery has been made known. It is as much a pleasure as it is a duty to tell farmers how they can grow and prepare upon their own farms a substitute for rice, farina, tapioca, sago, etc., for culinary purposes—something, in short, that shall be as good as either of the above substances for the use of the good housewife, to make a pudding—a pudding that is not a mere adjunct of a dinner, but a real substantial addition to it; as hearty as one of corn meal; more wholesome than that, more toothsome, and equally cheap; so that it is within the reach of all, both rich and poor; and as I think it a valuable discovery in the preparation of food, I am anxious that everybody should enjoy the benefit of my discovery.

"Necessity is the mother of invention." It was so in this case. It was discovered that a pudding could be got up in an impromptu manner, upon an emergency, in a farm-house, when the ingredients in most common use were exhausted.

For years popped corn had been an almost daily dish, all the family and all visitors liking it very much; but we had never thought of reducing it to meal, and applying it to culinary purposes, until one winter day, when a pudding was wanted, and it was not convenient to obtain any of the ordinary substances used for that purpose. To the cook's suggestion that corn meal might be borrowed, the mistress of the house replied: "No, no—my father would rather go hungry than live by borrowing. Besides, I don't think there is time to make a corn-meal pudding; it requires four good hours to cook it sufficiently, otherwise it always has a raw taste; for corn meal is never good unless cooked a great deal. I think you will have to give up the pudding, but I will ask my father."

So she did, and he said: "Let us have a pop-corn pudding."

"Oh, it will, I fear, be a waste of time and material. and prove a great failure."

"No matter: there is as much to be learned by failure as success. Let us try."

So we did. A pint of pop-corn was put through the operation, and it made sixteen pints of popped corn, which was first crushed with a rolling-pin on the kitchen-table, and then ground in the coffee-mill into a coarse meal, which measured eight pints. It is easiest crushed by putting it in a bag. We have since procured a large-sized coffee-mill, that grinds the corn without first mashing it. The difficulty was, that it was so light it would not feed regularly into the grinding-plates of the mill. We grow the corn for popping; it is a small, white, flint grain, upon small cobs, and quite prolific in its yield. It is popped in a small popper made of woven wire, and takes perhaps half an hour to pop and grind a pint.

419. **How to make a Pop-Corn Pudding.**—Mix five pints of the pop-corn meal with full four pints of sweet milk, and set it where it will warm slightly, and soak an hour or two. Then let it cool, and add two eggs, sugar, raisins, spice, as you would to a rice-pudding. Let it be set on a hot stove and boiled a few minutes, stirring it several times to get the meal well mixed with the milk, because it inclines, from its great lightness, to float, and if baked without stirring there will be a brown crust on top and custard at the bottom. It should be baked about an hour, and served hot, and will be eaten with great satisfaction—satisfaction that a new ingredient for a delicious, rich, wholesome pudding has been discovered—one always at hand, easily prepared, and one that has never failed to gratify the taste of all who have tried it.

The cost of such a pudding to a farmer is the cost of the sugar, raisins, and spice—the milk and corn I count at nothing. What should I count the cost of five eighths of a pint of corn and four pints of milk, which, if not eaten upon the table, would go to the pigs? The eggs would sell possibly for four cents, and the things bought cost as much more, in a pudding that fed eight hearty people. Let us then eat pudding—good, rich pudding—as much as we can at a meal, at a cost of one cent each. It is cheap; try it, and you will say it is good.

420. **Pop-Corn Griddle Cakes.**—Another use for this pop-corn meal is for griddle cakes. To my taste, they are quite equal to rice cakes, cooked in any way that rice is, and are much heartier. In fact, there is no stronger food for a laboring man than any of the preparations of corn in the way I have indicated. At the same time, its digestibility is unquestioned.

421. **The Philosophy of Popping Corn.**—The philosophy of the advantage

of thus preparing corn is worthy of our attention. Of all the cereals, Indian corn requires the greatest action of fire to fit it for food. It is full of essential oil, and that needs to be cooked, and it can only be done by a very high heat or a long-continued moderate one. If long continued, the other constituents of the corn are sometimes injured, and so are the ingredients added to the meal. If not well cooked, any article of food prepared from corn, however palatable, is not so digestible as wheaten bread. Now, in popping corn, it is subjected to a very high heat, which thoroughly cooks the oil, and fits the corn at once for food—a food that almost everybody loves, and so will everybody love the various preparations of food from meal made of popped corn, for it may be eaten without fear by the dyspeptic, and it will be eaten with satisfaction to appease hunger.

As we know that corn and corn meal, properly kiln-dried, will keep a long time, we may safely argue that meal prepared by a still more perfect system of fire-drying, will keep an indefinite length of time, or just as long as we wish. If ground and packed in barrels, the pop-corn meal will keep better than corn meal or flour, or even whole grain.

422. **Hulled Wheat, Wheaten Groats, and Boiled Wheat.**—*Hulled wheat* is another excellent substitute for bread. It can be hulled by lye, or by any of the mechanical means used for hulling corn or rice, one of which is to run it through millstones, set just far enough apart to rub off the husks. It is cooked by simply boiling, and is eaten in the various ways that we have mentioned for hominy.

Wheaten Groats, or "grits," as they are usually called, are coarsely-ground wheat—as coarse as it can well be ground. This is also a substitute for bread. It is cooked by boiling in plain water, as hominy or hulled corn and wheat should always be, until all the water is absorbed. It is eaten both hot and cold, or warmed over, and it does not require as much cooking as any preparation of Indian corn, and it is both palatable and healthful.

Every family, whether rich or poor, or in town or country, should make it a religious duty to use more corn meal, oatmeal, Graham flour, hominy, and cracked wheat for bread, in preference to fine wheat flour, both for health and economy. Look at the relative retail prices per pound of these articles, and see which will give the most nutriment for the least money; not which will afford you the most fashionable bread.

Boiled wheat is another simple form of preparing an excellent substitute for bread, particularly at harvest-time, while the grains are not as hard as afterwards. It should be carefully selected, and cleaned, and washed, and then soaked several hours, and boiled in the same water until some of the grains crack open. It may be eaten with meat, or as a dessert, with syrup, sauce, or milk.

SECTION XXV.—EXCERPTA OF USEFUL KNOWLEDGE FOR HOUSEWIVES.

UNDER this head, which really means selecting choice extracts from books that we read, we intend to gather up a great number of useful things, and concentrate them here for easy reference in a somewhat miscellaneous order.

We will open the section with a most valuable line of advice, selected from a letter of an excellent housewife to her daughter, when about undertaking the responsibilities of housekeeping. She says:

423. "**Always Buy Good Articles,** notwithstanding the first cost is more, in preference to cheap or low-priced sorts, which are generally the most uneconomical; and sometimes low-priced articles of food prove detrimental to health. Make it a point to read everything that comes in your way about domestic economy. You can not learn too much. Keep a little memorandum-book, with alphabet pages, and make it a rule to store up *excerpta* from all you read, for future use. It will prove to you a lasting source of useful knowledge. Frequently you need only make a reference in your memorandum where to look for what you want. No head is large enough for a storehouse of all that a good housewife will at some time want to know."

424. **Economy of Farm-house Lights.**—This is a very important question for the consideration of farmers' wives, who may find that it will not always be good economy to burn their own tallow. Certainly not, if it can be exchanged for a light-producing substance which will save the hard, unpleasant labor of candle-making, and at the same time afford a much better and a pleasanter light. Unfortunately, we have no standard of comparative cost of tallow—the almost universal source of farm-house light—with fluid substances. E. N. Kent, of the United States Assay Office, tells us, in the following table, which is the most economical as regards cost of oleaginous substances for light.

425. **Cost of Oils for Light Compared:**

Materials.	Lamp Used.	Retail Price of Oil per Gallon.	Cost of an Equal Amount of Light.
Kerosene oil	Kerosene	$1 00	$4 10
Camphene	Camphene	63	4 85
Sylvic oil	Rosin oil	50	6 05
Rape-seed oil	Mechanical	1 50	9 00
Whale oil	Solar	1 00	12 00
Lard oil	Solar	1 25	17 00
Sperm oil	Solar	2 25	26 00
Burning fluid	Large wick	87	29 00

426. **Cost of Oil and Candles Compared.**—Dr. Ure gives the comparative cost of an equal amount of light per hour from the following substances:

"Carcel lamp, with sperm oil, 1¼d.; wax candles, 6d.; spermaceti candles, 5¼d.; stearic acid candles, 4¼d.; molded tallow candles, 2½d."

427. **Economy of Kerosene Oil.**—From the foregoing it will be seen that kerosene oil is the least expensive of all fluid light-producing substances; and as it is now refined, and burnt in improved lamps, we believe it to be a very agreeable substitute for tallow candles, but whether cheaper or not can only be determined by actual experiments in different households, comparing the cost per gallon with the value per pound of tallow, and the light produced or the light required. As a general thing, farm-house lights are very inferior, and many a bright pair of eyes has been dimmed in consequence. It is on this account that this question of light should be more discussed and experimented upon. Do not continue to use candles, or any particular form of lamp or kind of oil, because you have long been in that practice, if there really is something better.

428. **How to Improve Candles.**—If you do use home-made candles, pray purify the tallow, and do not mix lard with it, though you may add a little alum, and never use your candles any sooner than you would soap—until they are at least six months old. Pack them in bran, and set them away in a cool, dry place, and see how much they improve by age.

It is well to mix beef and mutton tallow, but the proportion of the latter should be small, because it sometimes gives off a disagreeable odor. All good tallow is white, firm, and brittle, and dipped candles can only be made of it in mild weather. Be careful to use nothing but fine, white, clean cotton yarn for wicking.

429. **Lard—How to Make and Keep it Sweet.**—The lard of a hog of about a year old, fattened upon corn, and carefully rendered and packed in stone pots or sound oaken firkins, and kept covered close, will keep in a cool cellar just as long as any farmer's wife wants to keep it. Lard must be thoroughly cooked in rendering, to keep sweet.

A cooling-room attached to the ice-house is an excellent place to keep lard in summer. But remember that lard will never keep well in any place if it has been insufficiently cooked.

430. **Rice and Sago** should both have a clear, fresh, white appearance when you purchase. Rice with the largest whole grains is the best. Rice is remarkable for being the richest in starch, and most deficient in oil, of all the cultivated grains. Old rice is apt to be infected with weevil.

The small, white sago, called pearl sago, is the best. The large, brown kind has an earthy taste. These articles, and ground rice, tapioca, etc., should be kept in boxes or jars closely covered.

431. **Spices, Cocoa, and Chocolate.**—*Spices* should never be purchased by a farmer's family in a ground state. They are frequently adulterated, and always lose strength as soon as opened.

Nutmegs sometimes are kept in store until stale. Fresh ones can be selected by pricking with a pin at the stem end, when, if good, a drop of oil will ooze out.

Cocoa shells are apt to be musty from long keeping. Never purchase a large quantity until you have tried a sample and proved it fresh and sweet. Cracked cocoa is generally the best. Some that is carefully put up in papers keeps well. Chocolate is often adulterated so that it makes a nauseous beverage. Do not buy but a single cake until you prove it good. Both these articles are made from the cocoa beans, which grow upon small trees, cultivated for the purpose in Central America and other tropical latitudes. The beans are bitter and astringent, and are roasted like coffee to prepare them for use. They contain much more oil or fatty matter than coffee berries. It is rated in an analysis by Lampadius over 53 per cent. of the substance. The substance containing the aroma of the bean is given at 16.70 per cent. The shells are the dried fleshy pulp that surrounds the beans in the pods.

The cracked cocoa is the broken roasted beans. Chocolate is made of the beans, ground with hot rollers, and made into a paste with sugar, and seasoned with vanilla and spices, and if not adulterated, makes a wholesome beverage, but it is next to impossible to find chocolate that is pure.

432. **Coffee,** as it comes to us, is the half of a dried bean which was inclosed in a pulpy berry that grew somewhat like a cherry upon a tree naturally ten to thirty feet high, but kept pruned low in coffee plantations, which are to be found in most tropical countries. The best variety of coffee comes from Mocha, in Arabia. The berry is small and round, and the odor and flavor very agreeable; it bears a high price. And next to it is the Java coffee, a large, pale yellow berry. The Brazilian, commonly called Rio coffee, is the sort in most common use. The berry is of medium size, greenish color, and appears rusted with specks of gray. It is not a fine flavored coffee, having a good deal of acridness, but it is in favor with farmers generally, because "it goes farther than mild coffee." All coffee improves by age if kept dry. It should be roasted very evenly, of a light brown color, and used very soon afterward, as it loses value every day after it is roasted, and after it is ground it will become almost worthless by a few days' exposure to the air. Roasted coffee should always be carefully kept in a closed canister, separate from all food, as it rapidly absorbs odors. Roasting coffee in a room will always disinfect it of bad effluvia. It also imparts its own odor to other things, such as tea, butter, and bread.

In roasting coffee, first dry it gently in an open pan until it changes color, and then cover the pan and scorch it rapidly without charring a grain. The term, "burning coffee," implies a great error in its preparation, or ignorance of its character. Roasting renders the grains of coffee brittle, and makes the matter that it is desirable to extract more soluble in hot water, and produces as great a chemical change as fire does upon corn meal or any other article of food.

The peculiar aroma of coffee as it comes to the table, which gives it the flavor and stimulating effect ascribed to it, is never found in coffee grains before they are roasted. But if it is *burnt*, this flavor is destroyed, and in its place we have a bitter, acrid, tannic acid taste, which produces pyrosis in the stomachs of those who use it largely.

Never allow pepper and coffee to come in contact. The two should not be kept in the same pantry.

The best water for a decoction of coffee is that with a slight alkaline tincture, and it has been recommended to add 40 grs. of dry soda to a pound of coffee. It is certainly true that some of the springs of the Rocky Mountains, which are so alkaline as not to be drinkable, make good coffee. So do wells that will not make good tea.

Never buy ground coffee. Besides the fact that it loses strength, it is almost universally adulterated. Peas are largely used for this purpose, and beans, corn, dried carrots, turnips, chiccory, and several other substances are also employed.

433. **Tea—its Value as Food.**—That tea has a value as food, we can not doubt. Long before its use among European nations, the Chinese had settled this question to their satisfaction. If it is not of itself food, it seems to help us to assimilate other things. It certainly is a favorite beverage with all who are accustomed to its use, and so far as health is concerned, we believe it is certainly harmless, if pure, as the best black teas generally are. The green teas, either from the nature of the article, or from something added in curing, have a much greater effect upon the nervous system than the black teas. Pekoe and Oolong are the names of two of the best varieties of black tea. Gunpowder and Imperial are the two best green teas.

434. **How to Make Black Tea.**—Black tea must be boiled some minutes —thirty is better than less—in a close vessel, to get the fragrant aroma and all the vegetable extract that adds value to the delicious beverage we get from a well-made cup of good black tea.

Never use hard water for tea Filtered rain-water makes good tea. Never steep it in lukewarm water, and never let it come to the table at that temperature. The true aroma of tea is never obtained except when it is boiling hot. Tea should never be exposed to the air. Keep all ground spices, and also ground coffee, carefully excluded from the air.

435. **Sugar and Molasses.**—For most purposes refined sugars are the most economical. In buying raw sugar, select none but the cleanest sorts, such as the best New Orleans, or Santa Cruz, of a light straw color, coarsely crystallized. White Havana sugar is not as clean as white Brazil sugar. Select bright, light-colored molasses. Never buy the thick, dark-colored, sugar-house syrup. Its thickness does not indicate sweetness. For the table, the real "golden syrup" of the sugar-refiners is not only the best, but most economical. We make an excellent table syrup every year of maple-sugar dissolved in boiling water.

436. **Knowledge for the Kitchen.**—Here are a few simple rules for the kitchen that may be usefully remembered:

Oranges and lemons keep best wrapped close in soft paper, and laid in a drawer with linen.

Bread and cakes should be kept in a tin box or stone jar.

Salt codfish should be kept in a dry place, where the odor of it will not affect the house. The best kind is that which is called dun, from its peculiar color. Fish skin, for clearing coffee, should be washed, dried, cut small, and kept in a box or paper bag.

Soft soap should be kept in a dry place in the cellar, and should not be used till three months old.

Bar soap should be cut into pieces of a convenient size, and left where it will become dry. It is well to keep it several weeks before using, as it spends fast when it is new.

Cranberries will keep all winter in a firkin of water in the cellar.

Potatoes should be put into the cellar as soon as they are dug. Lying exposed in the sun turns them green and makes them watery. Some good housekeepers have sods laid over barrels of potatoes not in immediate use. To prevent them from sprouting in the spring, turn them out on the cellar bottom.

To thaw frozen potatoes, put them in hot water. To thaw frozen apples, put them in cold water. Neither will keep well after being frozen.

437. **Storing Butter and Cheese.**—The most economical, and, to our taste, the best table butter is that which is packed in September and October for the next winter's use. If well made, in a soft-water region, there is no difficulty about keeping butter sweet in a temperate climate, if properly made. Never keep butter and cheese together, except it is in a very cool room, and then not in close contact.

If cheese is rich and good, it always feels soft under the pressure of the fingers. Even if kept until quite old, it does not become horny. Be careful not to select a horny cheese. That which is very strong is neither good nor healthy. To keep one that is cut, tie it up in a bag that will not admit flies, and hang it in a cool, dry place. If mold appears on it, wipe it off with a dry cloth.

438. **Keeping Sweet Potatoes.**—One who is a successful grower of sweet potatoes in quite a northern latitude—near 42 degrees—gives the following as his method of keeping them over winter. He says:

"I use dry sand to put them up in; it does not matter how the sand was dried—in a kiln, a log heap, or in the sun—if it is dry, that is all that is required. I prefer drying it in a log heap, as it costs at least four times less, and is just as good. And a family that has a little room with a stove in it, may keep a box or two, with eight or ten bushels in them, without any inconvenience of consequence. The boxes must be raised a few inches from the floor, and they must not be less than four inches from the wall. Fill the boxes with potatoes, and then put in *dry* sand until they are covered.

"I have known them kept well in buckwheat chaff. In order to keep potatoes with success, there must be a thermometer kept in the room. The mercury must not sink below 40 degrees; if it does, the potatoes will chill and rot; and it must not rise above 60 degrees, or they will grow." (See 565.)

439. **Preserving Eggs.**—The following receipt is of such easy application that all housewives should try it, and satisfy themselves whether it is all that its author claims for it:

"Dissolve some gum shellac in a sufficient quantity of alcohol to make a thin varnish, give each egg a coat, and after they become thoroughly dry, pack them in bran or sawdust, with their points downward, in such a manner that they can not shift about. After you have kept them as long as you desire, wash the varnish carefully off, and they will be in the same state as they were before packing, ready either for eating or hatching."

440. **Beans—How to Cook them.**—"Few people know the luxury of baked beans, simply because few cooks properly prepare them. Beans generally are not cooked half long enough. This is a sure method: Two quarts of middling-sized white beans, two pounds of salt pork, and one spoonful of molasses. Pick the beans over carefully, wash them, and add a gallon of boiling-hot soft water; let them soak in it all night; in the morning, put them in fresh water, adding a teaspoonful of saleratus, and boil gently, till the skin is very tender and about to break. Take them up dry, put them in your dish, so as to have the beans fill the dish nearly to the upper edge; turn in boiling water till the top is just covered; bake with a steady fire four or five hours. Watch them and add more water from time to time, as it dries away. This is an old-time New England Saturday-evening dish."

441. **Tomatoes—Various Methods of Preserving and Using them.**—There is no way to preserve tomatoes for winter use so good as drying them. It is easily done thus: Scald, and peel, and stew to a gelatinous mass, and spread upon earthen plates, and dry in the sunshine or in a slow oven. It will then resemble dried stewed pumpkin, or the pulp of peaches dried in the same way. When wanted for use in winter, a portion of this dried tomato is soaked first in cold water, and that is gradually warmed till the whole becomes a homogeneous mass, more or less thick, according to the quantity of water used. It may be eaten as a sauce with meats, or, by adding sugar, as a sweetmeat, or in place of currant jelly with venison and mutton, or as a substitute for cranberries with roast turkey. It is an excellent and a cheap sauce.

Tomato Chowder.—To one bushel of green tomatoes add one dozen green peppers, 12 common-sized onions, one quart of grated horseradish, one cup of ground mustard, one ounce of cinnamon, one ounce of cloves, whole. The tomatoes, onions, and peppers chop fine. Put the tomatoes and onions in a vessel over-night, sprinkle a little salt over them, and in the morning drain off the water, put all together and boil them in clear water until tender, then drain the water from them, mix with the above-named spices, pack in a jar, and pour scalded vinegar over them.

Another way is to take green tomatoes, cut a small piece off the stem end, and also from the other side; then lay them in a pan. Sprinkle with salt, pour boiling water on them, and let them stand ten minutes. Pour the water off and serve them in the same manner again; then pour boiling water on them without salt, and let them stand a few minutes. Chop them up fine, putting in some cabbage, horseradish, and peppers; and when all chopped, put on salt, pepper, and vinegar, and they are ready to pickle in crocks. This makes an excellent relish with meat.

TOMATO CATCHUP.—Scald ripe tomatoes just sufficiently to allow you to take off the skins; let them stand for a day, covered with salt; strain them, to thoroughly remove the seeds; then to every two quarts add three ounces of cloves, two of black pepper, two nutmegs, and a very little Cayenne pepper and salt; boil the liquor for an hour; let it cool and settle; add a pint of the best cider vinegar: bottle, cork, and seal tight, and keep it always in a cool place.

ANOTHER WAY.—Take a bushel of tomatoes and boil them till soft; squeeze them through a fine wire sieve, and add half a gallon of vinegar, one pint and a half of salt, two ounces of cloves, quarter of a pound of allspice, two ounces of Cayenne pepper, five heads of garlic, skinned and separated; mix together and boil about three hours, or until reduced to about one half; then bottle, without straining.

TOMATO SAUCE.—One peck of tomatoes, one ounce of cloves, one ounce of cinnamon, one quart of vinegar, four pounds of brown sugar, two tablespoonfuls of salt, and the same of ground black pepper. Peel the tomatoes, and boil until very tender. Drain them from the juice. Now boil the sugar, spices, etc., in the liquid until it is thick as syrup; return the fruit into this syrup, and stew until the mass is a jam, and it keeps well any length of time. This may be used to flavor the following sauce:

442. **Picnic Sauce.**—Beat the yelks of four eggs perfectly; mix with the eggs a tumbler of jelly, four large tablespoonfuls of brown sugar, four large tablespoonfuls of mustard stirred into a batter with vinegar; to these ingredients add a teacupful of butter and two tumblers of best vinegar. Stir all together carefully; set the vessel in which you have mixed the sauce in a pot of boiling water and cook until it thickens and the egg is done; stir in a little salt and half a teaspoonful of Cayenne pepper and as much tomato sauce as will give it a pleasant flavor.

443. **Mushrooms, and their Uses and Production.**—It has been published that some of the great producers of mushrooms near Paris, who grow them in artificial caves, can produce at the rate of eighty quarts a day upon an acre of surface, which would give an annual crop of 29,200 quarts. Allowing the actual crop only one fourth of this quantity, it would be a very valuable one, as the average market price in New York is 25 cents a quart. Say 7,300 quarts for the product of an acre, at 25 cents, this would be $1,825 a year. The construction of artificial caves, however, is so expensive, that mushrooms are not likely to be much cultivated by farmers for family use, though many of them will continue to collect such as are produced spontaneously about the homestead; and to enable them to do so without danger of getting hold of other plants of the *agaric* family that are poisonous, we give the following rules to distinguish the edible mushrooms

from toadstools. Without giving the botanical characters, we notice some of the marks by which they may be distinguished:

First. The mushroom has no bad smell. The skin on the top of the mushroom will readily peel off. The gills or plates on the under side of the mushroom are of a white and pinkish or rosy hue, and though turning brownish by age, yet never of that lurid brown of the toadstool. When sprinkled with salt and allowed to stand a few hours, the mushroom gives out juice, but the toadstool becomes dry and leathery. If all these characters are united in the specimen it may be safely eaten, otherwise it should be rejected, as it would be better to throw away acres of good mushrooms than to eat one of the poisonous toadstools.

Secondly. Mushrooms which grow in marshy, shady places, and in thick forests where the sun has no access, are in general to be regarded as possessing dangerous qualities; their substance is softer, moister, and more porous than that of mushrooms used for the table. They have likewise a more disagreeable and dirty-looking appearance. Those which have a dusky hue, and change color when cut, or show a gaudy or many very distinct colors, particularly if they have been originally covered by skin or exhale a strong and unpleasant odor, ought not to be eaten. Those which have short bulbous stalks, or fragments of skin adhering to the surface, or which grow rapidly and corrupt quickly, should also be rejected. It has been generally supposed that poisonous mushrooms lose their deleterious qualities, but this is a rule to which there are many exceptions, and which ought therefore to be very cautiously admitted.

If you wish to grow mushrooms, procure some of the spawn from a gardener, and make a bed of light loamy soil, mixed with manure from horses fed upon grain; it will produce these plants when the temperature is right, which is about 50 or 55 degrees Fahrenheit, in dry, calm, summer weather. A cave cellar, or natural cave, or recess in the rocks, is a good place to make a mushroom bed.

444. **Drying Rhubarb.**—Rhubarb, when well prepared, will keep good for an indefinite period. The stalks should be broken off while they are crisp and tender, and cut into pieces about an inch in length. These pieces should then be strung on a thin twine, and hung up to dry. Rhubarb shrinks in drying more than any other plant, and when dry strongly resembles pieces of soft wood. When wanted for use, it should be soaked in water all night, and the next day stewed over a slow fire. None of its properties appear to be lost in drying, and it is equally as good in winter as any other dried fruit.

Another plan is to cook it first; for this get the Linnæus rhubarb. It is larger, more tender, and better flavored than any other, requires less sugar by one fourth, and has no skin to be taken off. Do not attempt to peel it, but cut in pieces as long as the thickness of the stalk, and put them with your sugar in an earthen dish without water; cover it to retain the flavor, and place it in an oven and cook till quite tender, without stirring or breaking the pieces. If too much cooked, it assumes a disgusting stringy appearance, and loses all fruity character. The rosy color of the stalks will give your dish an attractive appearance, and the dyspeptic will find in it a powerful aid to digestion.

This, if thinly spread upon plates, and dried in the sun or a slow oven, just as the pulp of peaches or stewed pumpkin is sometimes prepared, will keep as well as pumpkin, if packed away in thick paper bags or boxes, and kept in a dry place.

Rhubarb has within a brief period, quite within our memory, become generally diffused, and is now looked upon as a family necessity rather than a luxury. There are several varieties: Cahoon's seedling is the largest, but is rather coarse and not so high flavored as some others, of which we may have more to say under the head of the garden. We will only speak here of one or two methods of preserving the good qualities of the stalk by drying. For drying whole, the Victoria is one of the best varieties. Other sorts contain too much woody fiber.

445. **Facts about Pork and Bacon—How to Cure and Keep Hams.**—The best and most solid pork is made by rapid feeding of pigs in autumn, which have been kept growing, but not fat, all summer. Hogs that are kept fat through the summer are most apt to afford soft pork, which shrinks in the pot.

One writer says that—"Pigs should be wintered upon two ears of corn a day, fed very regularly, one at night and one in the morning, keeping them in a warm, close pen, without water, and they will hibernate in good condition upon this small amount of feed. If watered or fed with liquid food, and kept in the cold, much of the food is expended in keeping up animal heat. The pigs should be in good condition when put up, and must be well bedded to enable them to keep warm."

446. **Dry-Salting Bacon.**—Hams, or any part of the pig designed for bacon, we think, should never be put in pickle; they are decidedly better salted dry.

Our practice has been to weigh both pork and salt, giving six pounds of fine salt to one hundred pounds of pork. First sprinkle about one fourth of an ounce of saltpeter, finely pulverized, upon a ham or shoulder, and then rub it well over with salt, and pile up the pieces in some dry room, just as you would pile up a lot of stove-wood. It should be overhauled once, and the spare salt rubbed on fresh-looking spots, and the pile reconstructed so as to allow the air to come to all parts. It will completely salt in as many days as a ham weighs pounds.

For pickled pork, it is advantageous to salt it in bulk, before packing in barrels. Nothing will drain off from meat thus salted, but just what should drain away. When your pork is ready to go into the barrel, pack it as tight as you can force it in, and then fill the barrel with brine; not salted water, but brine, which is water saturated with salt. Pork thus cured will keep longer than we can calculate.

447. **English and Irish Mode of Curing Bacon.**—The *Irish Farmer's Gazette*

gives the following directions: "Singe off the hair, and scrape thoroughly clean; when cut up, rub the flesh side well with common salt, and pack the pieces on top of each other on a tray with a gutter round it to catch the brine; once every four or five days the salt should be changed, and the flitches moved, placing those on top at the bottom; five or six weeks of this treatment will suffice to cure the bacon, when it may be hung up to dry, first rubbing over with coarse bran, or any kind of sawdust except deal; if smoking be preferred, hang in a chimney; if not, in a dry, airy part of the kitchen, not too near the fire. We are not acquainted with the Limerick mercantile process; the Wicklow is similar to that given above, and practiced by farmers there."

An English recipe says: "For four hams, take two ounces of saltpeter, two quarts of molasses, one quarter of a pound of pepper, half an ounce of cochineal, and about three pints of fine salt. If the hams have been in salt pickle, the salt will not be needed. Pound the saltpeter and cochineal, then put all these ingredients together, and rub the hams thoroughly with the pickle, turning them every day."

448. **A Good Pickle for Hams.**—It depends partly upon how hogs are fed, but more upon the manner of curing than anything else as to the quality of hams. They can be made almost as delicate as tender chicken. For curing hams in pickle we have tried and approve the following compound of articles: To 100 lbs. of hams use 8 or 9 lbs. of rock-salt, 2 oz. of saltpeter, 2 lbs. of white sugar, 1 quart of best syrup, 4 oz. of saleratus, and 1 oz. of allspice.

These materials are boiled and scummed, in ten or twelve gallons of water, and the hams packed in a barrel, and the brine put on cool, adding water if necessary to cover the hams. None but a new oak barrel should be used. Scald the barrel and cool it before putting in the hams. Let them lie three weeks, and then take them out and air them twenty-four hours; put them back again three weeks, and then take them out and dry them thoroughly before smoking, which is done in an airy smoke-house, with cobs and maple or hickory chips. It is then a most delicious article of food. In smoking, be careful to keep your hams cool; never allow fire enough to heat the meat.

449. **Preserving Hams for Family Use.**—To keep hams through the summer, hang them in a dry, cool room, and draw a loose cotton bag over them, and tie it tightly around the string that holds the meat. This must be done before flies come in the spring, and it will keep them away. We have kept hams prepared in this way till over three years old, and they were as much better than new ones, as ripe old cheese is better than one a day old. The best hams that we have in this country are from hogs fed upon beech-nuts; but hams of hogs fatted upon corn are much better than those from what are generally known as mast-fed hogs.

450. **How to Cook a Ham.**—Never put a ham into a kettle of cold water, and be equally careful never to put one into boiling water. First let the

water become lukewarm; then put in the ham. Let it simmer or boil lightly for four or five hours—five is better than four—then take it out and shave off the rind. Rub granulated sugar into the whole surface of the ham, so long as it can be made to receive it. Place the ham in a baking-dish, with a bottle of champagne or prime cider. Baste occasionally with the juice, and let it bake an hour in a gentle heat. A slice from a nicely-cured ham, thus cooked, is enough to tempt a Jew.

451. **Sausage-Making.**—All the lean scraps of pork that accumulate in cutting up the pigs, whether for bacon or pickled pork, will be most economically used if made into sausage meat. But do not attempt this work unless you have a good sausage-meat cutter; and if you wish to stuff the meat into cases, you should have a combined cutter and stuffer, so as to do the work at one operation. Cut the pork into small pieces, and divide it in parcels of about a quart, upon a clean table, to which the cutter should be fastened. Mix your seasoning of salt, sage, thyme, cloves, pepper, and a little sugar, if you like it, with your meat, and then put it through the cutting-machine, thus nicely blending the seasoning with the meat, which passes directly into the cases, and finishes the job with great expedition.

452. **The Value of Pork in Bacon.**—If bacon sides should range at 13 cents per pound, shoulders at 10 cents, and hams at 15 cents; and prime pickled pork at $18 per barrel, mixed pork at $16, and rumps at $14 per barrel, we would advise all small farmers, who have a limited force to feed, and a limited purse to empty, to buy the rumps; they are about eight inches of the small end of the backbone, with the tail cut off, and consisting of a due proportion of fat, lean, and bone, and are the cheapest meat diet that can possibly be purchased by planters for their people.

453. **How to Cure and Cook Corned Beef.**—For a pickle, to every 100 lbs. of beef, take five lbs. of salt, a quarter of an ounce of saltpeter, and one pound of sugar; dissolve in sufficient water to cover the meat. Do not get your meat too salt, for it makes it tough and tasteless. Do not allow it to remain over two weeks in the first brine, for it takes up all the blood that was in the meat, and consequently ought to be drained off, as the meat will be much more likely to be injured than it will when separated and replaced with fresh-made brine: but more especially in warm weather. In this way it will keep with just sufficient salt to season it. In the second place, the cooking is of just as much importance as the corning; it should be boiled at least four hours, or until it can be cut and eaten as readily as a piece of soft bread. Not one half of the domestics cook their meat long enough. Try it once and you will see the difference. Meat prepared in this way can be eaten with a relish, and is easily digested, giving nourishment and strength to the body. But fried meats, or meats half cooked, can not be properly masticated or prepared for the action of the stomach, and are among the most indigestible articles of nourishment. Some persons are always in too much of a hurry or too lazy to chew their food, thereby favoring their teeth and throwing the responsibility upon the stomach. Frequent abuses of this

important organ develop disease, and the individual is said to have dyspepsia with all its attendant evils. Therefore, spare not the cooking; you will have the less chewing, and greater advantage of the food.

454. **Italian Mode of Cooking Scrap, or Coarse Portions of Beef.**—A very economical and most savory and delicious dish can be made with two or three pounds of chuck steak, or cheap parts of beef, which infinitely surpasses the tasteless, insipid, common eating-house stuff, called "beef à la mode." Cut the steak into pieces of less than two inches square; season with black pepper and salt, put them into a saucepan with a full half pint of cold water on the fire, and as soon as it boils up, remove it from the fire and set it where it would simmer for two hours and a half, until perfectly tender. While simmering, tie up in muslin a bunch of sweet herbs, composed of knotted marjoram, winter savory, and a little thyme, and take it out just before the dish is served. Of course, the stew must occasionally be shaken, as all others are; remember, however, the fat must not be skimmed off; the more fat there is, the better the stew. The dish is of Italian origin, and is eaten by Italians with plain boiled macaroni and Parmesan cheese, or with a salad, and with either is a dainty dish.

455. **Pressed Beef.**—This is another excellent way of using up the cheap parts of fresh beef, or even that which is corned by the receipt given in No. 453. Boil any ragged scrap pieces, with not too much fat, until the bones will freely separate from the meat, which pick off and pack in any strong dish, and add such seasoning as you wish of salt, pepper, spice; some add a trifle of molasses or sugar, and press the whole into a cake, just as those do who make "head-cheese" from that portion of pork that is better prepared in this way than any other.

456. **Useful Little Things for Housekeepers.**—"The truest economy begins in little things." And so we give a dozen of them in a bunch to conclude our "excerpta of knowledge for the kitchen."

MAHOGANY STAIN.—Take four ounces of red sanders, one pound of fustic, and an ounce of logwood, and boil them in half a gallon of water for one hour; then apply it warm with a brush or sponge; when dry, apply varnish. With this you can renovate old furniture.

A CHEAP REFRIGERATOR.—"Two tin pails, soldered one into the other, the space between them filled with charcoal, in small pieces (not necessarily dust), with the cover arranged in the same way, will keep a small quantity of ice a very long time. Three inverted tea-cups, or something made for the purpose, should support the ice to keep it out of the water. Next to putting the ice in a tin pail and wrapping it in a blanket, this is the simplest ice-keeper we know of, and it is entirely philosophical and effective."

To this we add the recommendation of putting this tin pail, with the ice in it, with a hole as big as a pin at the bottom and dripping-pan under it, in a chest or close-shutting closet, the air of which will be cooled, with the provision placed in it.

This, of course, is only a substitute for a good refrigerator, but will be found much better than none, and can be made for almost nothing, by any man with Yankee gumption.

To Make Tough Meat or Fowl Tender.—One or two tablespoonfuls of sharp vinegar put into the water when set to cook will do this, and in no way impair the flavor of the stew or soup. Veal to roast is much improved by being rubbed all over with vinegar and allowed to remain two or three hours before cooking. Fifteen minutes to the pound is the received rule for roasting and boiling meats, and ten for fish.

How to Use Salt.—Beef or mutton should not have a bit of salt put upon either when first set to roast; just before serving, baste the meat, sprinkle fine salt slightly over it, dredge flour on, and let it brown up. Poultry must be covered with sweet lard and salt—a teaspoonful of salt to two of lard—before roasting.

To Prevent Metals from Rusting.—Melt together three parts of lard and one of rosin powder. A very thin coating applied with a brush will preserve Russia-iron stoves and grates from rusting during summer, even in damp situations. For this purpose, a portion of black lead may be mixed with the lard. The effect is equally good on brass, copper, steel, etc. The same compound forms an excellent water-proof paste for leather. Boots, when treated with it, will thereafter take the usual polish when blackened, and the soles may be saturated with it without soiling the floor, as it does not rub off.

Seeds and many other things are best kept in wooden boxes. By a new patent contrivance, boards are cut about one eighth of an inch thick, of suitable length and width to bend into forms for the sides of a round box, the largest holding about a peck, and eight others, smaller and smaller, to form a nest. The ends are fastened together with some kind of glue, and the bottoms are fastened in by a rim of tin bent over the corner; and the lids are made in the same way, so that the ends may be of stuff but little thicker than the sides. The tin corners are great protectors against mice, as that is the only part of a circular box likely to be gnawed into, and this makes them quite safe for seeds and better as well as cheaper than tin boxes, and a decided improvement upon the old-style circular wooden boxes which have bottoms made of a half-inch board, so as to nail it in. We should think that half bushel and smaller measures, made up on the same plan, with iron instead of tin corners, would be first-rate.

Unpleasant Odors arising from boiling ham, cabbages, etc., are completely corrected by throwing whole red peppers into the pot, and at the same time the flavor of the food is improved. Pieces of charcoal will produce the same effect.

A Good Way of Roasting Apples.—Select the largest apples; scoop out the core without cutting quite through; fill the hollow with butter and fine, soft sugar; let them roast in a slow oven, and serve up with the syrup.

Hodge-Podge.—Cut two pounds of mutton into small pieces, and put them in a stewpan with three quarts of water and a tablespoonful of salt. Set it on the fire and let it come to a boil; then set it where it will simmer an hour; keep it well skimmed; then add one carrot, two turnips, two large onions cut into small pieces, and half a dozen lettuce-heads, and let the whole cook quite tender. Skim off all the fat, and serve either with the meat in the soup or separately. A pint of green peas boiled in the soup will be found to be a great addition.

HAIR-BRUSHES are best cleaned by washing them in sal soda or saleratus water, which removes all the oily coating.

SAGE and all other herbs for family use should be cut when the plant is budding for blossom, and dried in the shade, and then stored in thick paper bags, and there is no better place for them than hanging from the garret rafters.

TO CLEAN KNIVES.—Take a potato, cut in halves, and dip the cut part in brick-dust and rub the knives, the potato affording just enough moisture.

FOR CLEANING TAINTED BARRELS.—Put one peck of charcoal and one tea-cup of saleratus into each barrel, fill them up with boiling water, cover tight, and let them stand until cold.

457. **Vermin-Remedies—Moths, Bugs, Ants.**—Moths are driven away, it is generally believed, or rather the miller that lays the eggs is, by any strong odor; so that furs or woolens, packed in a chest of camphor-wood, or of cedar, or sassafras, or with the shavings of those woods, or with gum-camphor, or tobacco, snuff, or pepper, are preserved from the ravages of these pests. After moths commence eating, they pay no regard to the presence of camphor, cedar, or tobacco; in fact, I think they enjoy the latter, if anything else than humanity can. The superiority of pepper to camphor, as a preventive of moths eating furs, consists in the fact that, while the eggs will hatch among camphor, there is something in the aroma of pepper which destroys their vitality. Woolens may be safely stored in a close linen bag if often looked after. And probably looking after is the best of all the preventives, for moths never work where they are frequently disturbed. But if articles are packed in linen bags, they should be taken out and aired once a month during summer.

Before packing away furs, they should be well beaten, to dislodge the moths that, despite the most scrupulous care, may be deposited in them. But the dreaded and inconvenient taking up and beating carpets will not always insure success; but one who has tried it, says: "I conquered them wholly in this way—I took a coarse crash towel and wrung it out of clean water, and spread it smoothly on the carpet, then ironed it dry with a good hot iron, repeating the operation on all suspected places, and those least used. It does not injure the pile or color of the carpet in the least, as it is not necessary to press hard, heat and steam being the agents; and they do the work effectually on worms and eggs. Then the camphor will doubtless prevent future depredations of the miller, by placing a few little crumbs under the edges of the carpets without moving them."

Patchouli is recommended as a preventive of moths. *Sachets de patchouli* are made of cotton-wool, among which a few grains of the powdered patchouli leaves are mixed, and folded in paper. Placed among clothes, they are said to drive away moths. In Hindostan, patchouli is used by the women for scenting their hair, and it is also mixed with tobacco for the hookah. In this country the patchouli leaves, it is said, will retain their scent if dried in the dark by being placed singly in a drawer, and turned daily for a fortnight. The Arabs dry the leaves and stuff pillows and mattresses with them, believing that they prevent contagion and prolong life; a belief which attaches among the ignorant to sage and other odoriferous plants. As a scent, patchouli is used by perfumers chiefly for mixing with other aromatics.

Benzoin is used in the museum of the *Jardin des Plantes*, at Paris, to keep the moths out of the skins of the animals.

Tallow packed with clothes is also a moth preventive. But after all, frequent shakings are the best preventives of all injuries by moths or mold.

Bugs may be killed with alum. Make a solution of alum, as strong as water will dissolve, and apply that hot to places infested with bugs of any sort, in bedsteads, closets, or trees and plants, taking care not to apply it so as to kill tender plants, and the bugs will take a strong dislike to the locality. You may brush it in cracks and crevices of floors, ceilings, or walls of a room, or in the holes and nesting-places of these small vermin in trees.

Corrosive sublimate is excellent for bugs and ants. For bedsteads it may be mixed with soap. For ants, with lard and sugar, through which draw woolen yarn, and fix it in cracks infested with ants.

458. **Rat Remedies.**—Chlorid of lime has frequently proved a sure thing to drive rats away from any place infested by them. An ounce of it, scattered in the place where they come to feed, or wrapped in a bit of muslin and put in their holes, where it acquires dampness, produces a gas that is not offensive to man, but is to the rats. If chlorid of lime is moistened with muriatic acid, and placed in a drain, vault, or cellar, and closed from the air a little while, the rats will depart, because it will be death to remain. This is also a good disinfectant, and will for a time remove the effluvia of a dead rat. One application of dry chlorid of lime to rat holes has driven them away for a year. If they return, a renewal of it will start them again.

Cats are the best rat-traps that we have found after many years' experience, and next to cats, the chaff-trap. This is best made by partly filling a large, smooth kettle with water, and then covering with a few inches of chaff. The first rat that gets in makes a great outcry, which brings others to share his fate.

The best food with which to mix poison for killing rats is pumpkin seeds. Wet them, and sprinkle on a little arsenic, which will adhere to the seeds. They will be eaten by rats and mice, while cats, fowls, etc., not being fond of such food, will not meddle with them. Wherever poison is put for these troublesome pests of the farm, water should be near by, so that they may eat, drink, and die outside of their holes and hiding-places. Musk-rats, which are often troublesome pests upon some farms bordering creeks or ponds, may be poisoned with arsenic upon pieces of parsnep or sweet apple. Gunpowder, flashed in rat-holes, is said to be good to drive them away from the premises.

459. **Disinfectants and the Value of Disinfecting.**—Nothing conduces more to promote the health of a family than pure atmosphere. It can be kept so only in dwellings properly constructed for ventilation. From sitting-room, dining-room, and bed-rooms we have air flues that have a strong draught out of the top of the house, and the kitchen is largely furnished with ventilation. In all unventilated rooms of the house, and in sick chambers, odors at times accumulate so as to need disinfecting, while cellars, sinks, outhouses, and stables often need it. Coffee roasted in a room, solution of copperas sprinkled about, or cloths wet in it and hung up; chlorid of lime moistened, each acts quickly as a disinfectant. The odor of a dead rat can be allayed at once by moistening an ounce of chlorid of lime with a teaspoonful of muriatic acid. But no one should breathe much of the gas it engenders.

There is a considerable difference between a deodorizer and a disinfectant. The former either merely removes or disguises a foul odor; the latter changes the character of the matter which creates the effluvia, and prevents it from sending forth disease. Fresh slaked lime and charcoal dust are very good deodorizers, but their disinfecting powers are not equal to some of the salts of manganese, which, when they combine with pestilential fluids in sinks and drains, give out at the same time a considerable quantity of pure oxygen to refresh the atmosphere. The manganate of soda, or potash, has recently been tried in London with much success in deodorizing and disinfecting the water of the river Thames, and its use in our cities during dry weather may be of great benefit. It is applied by dissolving it in warm water, and pouring it into the sink or drain to be disinfected.

M. Herpin, of Paris, in the *Journal de Pharmacie*, recommends dried and pulverized plaster of Paris, mixed with rather more than one fifth of its weight of powdered charcoal, as a cheap and most effective disinfecting mixture. It entirely removes the noxious emanations from decomposing organic matters, fixing the ammonia, and forming a valuable manure.

Prof. Nash, of Amherst College, gives the following formula for making what may be termed home-made chlorid of lime:

"Take one barrel of lime and one bushel of salt, dissolved in as little water as will dissolve the whole; slake the lime with the water, putting on more water than will dry-slake it, so much that it will form a very thick paste; this will not take all the water; put on, therefore, a little of the remainder daily until the lime has taken the whole. The result will be a sort of impure chlorid of lime, but a very powerful deodorizer, equally good for all out-door purposes with the article bought at the apothecary's, and costing not one twentieth part as much. This should be kept under a shed or some out-building. It should be kept moist, and it may be applied whenever offensive odors are generated, with the assurance that it will be effective to purify the air, and will add to the value of the manure much more than it costs. It would be well for every farmer to prepare a quantity of this, and have it always on hand."

How much more sensible it would be for the city authorities to use this mixture, which concentrates effluvia, instead of quicklime, which dissipates it through the air and into everybody's lungs!

To prove how quickly the air of a sitting-room becomes impure, place in it a pitcher of iced water, and in a few hours it will have absorbed from the room nearly all the respired and perspired gases of the room, the air of which will have become purer, but the water utterly filthy. This depends on the fact that the water has the faculty of condensing, and thereby absorbing all the gases, which it does without increasing its own bulk. The colder the water is, the greater its capacity to contain these gases. At ordinary temperatures a pint of water will absorb a pint of carbonic acid gas and several pints of ammonia. This capacity is nearly doubled by reducing the temperature to that of ice. Hence water kept in the room awhile is always unfit for use, and should be often renewed, whether it has become warm or not. And for the same reason, the water in a pump-stock should all be pumped out in the morning before any is used. That which has stood in the pitcher during the night is not fit for coffee water in the morning. Impure water is injurious to health as well as impure air, and every person should provide the means of obtaining it fresh and pure for all domestic uses.

460. **Soap-Making and Washing.**—Wood ashes made from any hard wood will make soap. Pine ashes are nearly worthless. Beech, maple, birch, and hickory are among the best sorts for leaching. Put sticks and straw in the bottom of the leach-tub, packed close, and four quarts of lime to a barrel of ashes, which wet and pound down as you put in, and then put on water slowly two days before you let the lye run, and it will come strong, but should be boiled still stronger before you put in grease. Bones, rinds, gristle, and hard scraps must go into very strong lye, and will then soon be eaten up, all but the earthy part of bones, which skim out and save for the grapevines and pear-trees. Make the soap strong of grease as well as lye, and do not use it till very old, and it will be very good. It should be of a salvy consistence.

To make soap with potash: Use the best quality of "first sorts" of potash, in the proportion of six pounds of potash to seven pounds of grease, for a barrel of 40 gallons. Break up the potash into small lumps and dissolve 24 lbs. in two pailfuls of hot water. It dissolves rather slowly when the potash is good. When dissolved, put the solution into the kettle, and add the grease quite warm, and stir the mixture together; allow it to stand all night, if convenient. In the morning apply a moderate heat until the mixture appears ropy; then fill up with cold water. Cost, say 6 lbs. of potash, 36 cents; 7 lbs. grease, 28 cents—64 cents for a barrel of soap. Another receipt says:

"One hundred pounds of good soap for $1 30: Take six pounds of potash, 75 cents; four pounds of lard, 50 cents; quarter of a pound of rosin, 5 cents. Beat up the rosin, mix all together well, and set aside for five days; then put the whole into a twelve-gallon cask of warm water, and stir twice a day for ten days, at the expiration of which time you will have about one hundred pounds of excellent soap."

The following is considered a valuable aid to the washerwoman, by one who has tried it. She says:

"Take one pound of sal soda and half a pound of unslaked lime; put them in a gallon of water and boil twenty minutes; let it stand till cool, then drain off and put it in a stone jug or jar. Soak your dirty clothes all night, or until they are well wet through, then wring them out and rub on plenty of soap, and to one boiler of clothes well covered with water add one teaspoonful of the washing fluid. Boil half an hour briskly, then wash them thoroughly through one suds, and rinse well with water, and your clothes will look better than the old way of washing twice before boiling. This is an invaluable recipe, and I do want every poor tired woman to try it."

Another one says: "Take two pounds of soda ash, two pounds of hard soap, and ten quarts of water; cut the soap fine; add all together, put into a kettle, and bring to a boil, then take it off the fire and stir until nearly cool. Put your clothes to soak the evening before you wash. In the morning, wring out, boil them in water, to which is added nearly a pint of the compound to every pailful. Wash out in the same water and rinse, and your washing is done."

461. **Washing Machines** have been contrived, patented, made, and sold and discarded almost as numerously as "patent churns." We have tried a good many. The churns have all been given up for the old dasher, and notwithstanding washing was "made easy," the old wash-board still holds its place, though some washing machines are worthy of commendation as assistants in the laundry. None will do all the work. Perhaps our lady readers will say that we ought to tell them which to buy. We can not do it. The latest experience of our family is decidedly in favor of Doty's New York machine, "improved," which acts upon the plan of a cloth-dresser's fulling-mill, and is very easily worked. The "Metropolitan washing machine" is the pounding barrel improved by springs that make it work easy. It is useful for heavy work. CLOTHES WRINGERS are worthy of the highest commendation. They are the most important of all household labor-saving machines. They are made of different forms, but the principle in each is the same, being constructed to attach to the edge of a wash-tub, and contain two elastic rollers which are turned by a crank with one hand, while with the other the washer picks up one end of a garment and holds it to the rollers, through which it passes rapidly and falls into a clothes-basket a great deal dryer than any

woman could wring it with all her strength and ten-fold more time. These machines cost from $5 to $10, according to size, and are very simple in construction, very effective, and look as though they would be very durable, and are certainly very great labor-saving machines, and one should be in every family, and we are doing a public duty in making them as extensively known as any other fact for farmers. With a Metropolitan washing machine and a clothes-wringer, or, rather, a clothes-squeezer, which has been several years in use in the author's family, washing-day is no longer one that is dreaded. With these, washing is made easy.

462. **Soft Water.**—No woman can wash with any satisfaction unless she has soft water. It is for this that we have treated so fully upon cisterns—333, 334, 335. Hard well water can be softened with lye, potash, or soda. We have seen a statement that a well of hard water was permanently cured by putting four feet of coarse gravel in the bottom, where the water oozed in through the blue clay. We recommend that a space at least a foot wide behind the wall should also be filled with gravel as high as the water comes in.

As IRONING follows washing, we say: If your flat-irons are rough, rub them well with fine salt, and it will make them smooth; so will rubbing them with a waxed rag. Be sure to use them hot.

463. **Beds and Bedding.**—There is no article of household furniture of so much importance as the bed. It is the place where exhausted nature enjoys recuperation, and all that art can do to make it comfortable at all seasons of the year, should be done, particularly in the farmer's home, where the nature of the labor is so exhausting. We are so much opposed to feather beds, that we have not had one in the house for many years, and we never sleep more comfortably than we do at home upon hard mattresses. We think that feather beds ought to be done away with, especially in warm weather. For spring, summer, and fall, husk beds ought to be in use in every family, and would be if better known. There is no better time for procuring husks than when the corn is being harvested, and the husks will be much nicer and cleaner when corn is cut and shocked, and not become so dry and weather-beaten. A good husk bed will last from twenty to thirty years. Every farmer's daughter can supply herself with such beds against time of need at a trifling expense.

No one who has not tried them knows the value of husk beds, which is such that some persons think that straw and mattresses would be entirely done away with if husk beds were once tried; that they are not only more pliable than mattresses, but are more durable, and the first cost is but little. To have husks nice they may be split after the manner of splitting straw for braiding. The finer they are the softer will be the bed, although they will not be likely to last as long as when they are put in whole. Three barrels full, well stowed in, will fill a good-sized tick, that is, after they have been split. The bed will always be light, the husks do not become matted down like feathers, and they are certainly more healthy to sleep on.

464. **Home-Made Mattresses of Hair and Wool.**—Hair mattresses can also be made in every farmer's family of very good quality out of pig's hair, which should be cleaned in the same way that fine wool is cleaned of all its gummy dirt. See 129. Where sheep are kept, a great deal of good material for mattresses can be saved from taglocks and clippings of wool, which can be cleansed with but little trouble by placing them some days in a basket in a running stream, or even by soaking in still water. The filth dissolves without injury to the wool. The cardings of horses and bullocks, if saved and cleansed, will soon accumulate enough for a mattress; for one of twenty pounds on the top of a husk one will make a luxurious bed. There is no secret about making a mattress. Holster the edges upon one of the sides, and lay it flat on the floor or a broad table, and fill in the material evenly of an equal thickness all over, and then sew on the top and lift the mattress upon two or three narrow strips of boards supported at the ends upon tables, benches, or barrels, so that you can stitch through and through with a long needle which you can buy for such work, using strong, smooth linen twine, with a cloth button under the loop of each stitch.

Cotton makes a soft, pleasant mattress when new, but it soon mats together, and we do not esteem it a healthy material for beds or bedding, except for sheets and light quilts. Beech leaves make a very good mattress, clean, sweet, and wholesome; they are best when gathered by hand from green trees. Straw, too, is always much better cut in a green state and dried in the sun, and rye straw is the best kind.

The best vegetable material ever used for mattresses, and almost equal to hair, is the long moss which grows upon forest trees, covering them as with a gray beard in several of the "Confederated States." It requires to be macerated in water until a thin cuticle peels off by washing, or by drying and beating, leaving the black, hairy-looking threads of the interior, which are very tough and durable.

465. **How to Make Bed Comforters.**—The best bedding ever used is linen sheets and blankets for summer, and cotton sheets and blankets for winter. But as all can not have blankets, we will tell them *how to make bed comforters.* It may be new to some readers that nice, warm bed comforters can be made without the labor of quilting.

Make two calico spreads, old or new, and tack one in a quilting-frame, if you have one, and if not, spread it on the floor and lay on four pounds of cotton batting, and then the other spread, and tack through and through with a darning-needle and tie tight over a piece of bright colored cloth, or yarn, or wool, in squares of a foot, and you will have a neat-looking warm article of bedding. Two persons can make five of them in a day.

466. **Improvement in Quilting-Frames.**—And why not improve quilting-frames? They need it. The old ones are about as awkward contrivances as ever were conceived—always in the way when in use, with their long arms sticking out all over the room long after they had ceased to be useful. What man ever looked upon these necessary implements of household econ-

omy with any satisfaction? He looks every time he comes into the house with an anxious eye at the progress of the work, "hoping the confounded long-armed quilting-frames will get out of the way some time." Now, for the special benefit of such nervous gentlemen, some good soul out in Michigan has invented a quilting-machine that has no arms to stick out in the way. "Necessity is the mother of invention," and this inventor, we suppose, lived in a log-cabin only sixteen feet square, which, as it contained two beds and a cooking-stove, had no spare room to set up the quilting-frames on four chairs; so he contrived a machine something like this, as near as we can understand the description: Frame four legs together like the frame of a kitchen table, with side pieces nine feet long, dropped five inches below the top of the legs, and end pieces two and a half feet long. Now take some scantling, two or two and a half inches square, and round them with inch round tenons upon each end to work in sockets in the top of the legs. Upon one end of each of these rollers have a little ratchet wheel and catch, and nail a strip of cloth along one side of each to which to tack the edges of the quilt. When all ready, roll it all but the two and a half feet wide strip upon one roller and tighten the catch; now quilt that side and roll upon the other roller and so on till finished. The side pieces should be made to go in with a key, so that the frame can be taken down and packed away at any time, even with the quilt half finished, as it can be rolled up snug. It is a simple piece of domestic machinery, but would add to the comfort of many a household.

467. **Carpets and Carpet Sweepers.**—Keep a broom exclusively for carpet sweeping. Never use it for any other purpose. Every one knows that the daily dust arising from sweeping carpets causes a permanent injury to furniture, books, pictures, and the lungs. It is an old but good way to sprinkle the floor first with damp tea-leaves, and then sweep with a bristle brush; but latterly we have found it much easier and more convenient to use one of the new revolving carpet sweepers, which takes up the dust and puts it away in a box so it does not rise without using any moistening application. They are especially suited to libraries, offices, cabinets, and parlors.

The most economical carpet, probably, is a good, stout American ingrain, which will cost about two dollars a square yard. If you are buying a carpet for durability, choose small figures. A farmer should never grudge the money to cover one room, at least, with a first-rate carpet, and cheaper ones for sitting-rooms, bed-rooms, and dining-room, if one is set apart for the latter purpose. There is no furniture that adds so much to the comfort of a house at the same cost as carpets. These is no labor better bestowed about a house than giving the carpet a thorough shaking and beating in a hot, dry day, upon the clean grass, at least once a year.

You need not hesitate to wash a carpet with strong soap-suds, with a brush, as it lies upon the floor, using clear water afterward, and drying it by ironing upon coarse towels spread over the wet spots.

468. **Removing Stains—Beef-Gall.**—There is no better substance than the

very cheap article—upon most farms—of beef-gall to take out stains upon carpets, as well as many other things.

The clarified gall of the ox is also much used by scourers for renovating the delicate colored silks and satins. In its natural state it contains greenish coloring matter, and is then only applicable for restoring the brightness of dark materials. It is de-colored thus: Take one pint of gall, boil and skim it, then divide into two parts; to one half pint add half an ounce of salt, to the other add half an ounce of powdered alum; each part is to be heated till the additions are dissolved; then pour into separate bottles, and allow them to stand in a quiet place, and clear for a month or eight weeks, even longer if not bright. The clear portions of both are then to be poured gently off the sediments and mixed together; the coloring matter coagulates and falls, from which the transparent gall is finally separated by filtering through blotting-paper. In this state it will keep any length of time with its qualities unimpaired, and free from odor.

If the stain upon silk or satin is produced by an acid, such as from fruits, and that upon black or dark colors, the best re-agent is liquid ammonia (strong hartshorn) rubbed in till it disappears. For plain and figured silks, of delicate colors, we can not give a general rule, and therefore leave them to be operated upon by the professional *dégraisseurs*. To obliterate grease spots from white silk or satin, we may proceed as directed for colored silks; but fruit, ink, and glove marks require a different treatment. These marks are generally removed by dampening the part with oxalic acid dissolved in water; about the eighth part of an ounce in a wine-glassful of water is strong enough. The common salts of lemon in water also answer well. Coffee-stains, mud-splashes, etc., will mostly give way to the use of soap and water. Curd soap should be applied for this purpose.

For grease spots upon cloth and all kinds of woolen goods, soap and water may be used without fear, provided it is well washed out afterward. Fuller's earth or powdered French chalk, made into a paste with water, and laid upon the part, is, however, the best application, to be brushed out when dry.

Paint marks are removed with turpentine, the smell of which may be quickly dissipated by hanging the article upon a line in the air.

Silk articles should not be kept folded in white paper, as the chlorid of lime used in bleaching the paper will probably impair the color of the silk. Brown or blue paper is better; the yellowish, smooth India paper is best of all. Silks intended for dress should not be kept long in the house before they are made up, as lying in the folds will have a tendency to impair its durability by causing it to cut or split, particularly if the silk has been thickened by gum. Thread-lace vails are very easily cut. Articles of velvet should not be laid by with any weight upon them. If the nap of a thin velvet is laid down it is not possible to raise it up again. Hard silk should never be wrinkled, because the thread is easily broken in the crease, and it never can be rectified. The way to take wrinkles out of silk scarfs and handkerchiefs is to moisten the surface evenly with a sponge and some weak glue, and then pin the silk with some toilet pins around the selvedges on a mattress or feather-bed, taking pains to draw out the silk as tight as possible. When dry, all the wrinkles will have disappeared. It is a nice job to dress light-colored silk, and few should try it. Some silk articles should be moistened with weak glue or gum-water, and the wrinkles ironed out by a hot flat-iron on the wrong side.

To Take Grease Out of Silk.—Rub a lump of wet magnesia over the spot; when dry, brush off the powder, and no grease will be seen. It may be applied to other stuffs. This is an old and well-tried remedy; but there is a newer and better remedy, but not so thoroughly proved—this is *benzine*, the most complete substance to cleanse all fabrics that we have ever seen.

Ox-gall and turpentine are both good to take out grease. If turpentine be employed, it should be distilled, and perfectly free from rosin. The preparation called scouring-drops is pure turpentine, perfumed with essence of lemon. Either of these substances may be applied with a piece of sponge, or with a remnant of the same material that is being cleaned. When the grease spot is large, the greater part may be removed, in the first instance, by the application of blotting-paper and a hot iron.

Use a piece of zinc to stir your glue, or keep a small piece of zinc in the bottom, and it will—so we read—prevent it from acquiring that unpleasant odor common to glue. Where glue is always to be heated with steam, a zinc glue-pot is recommended.

The presence of cotton in woolen fabrics may be easily recognized by the following tests:

When boiled for twenty minutes in a solution of nitrate of mercury, the woolen fibers acquire a red color, but the cotton fibers remain colorless. When the fabric is boiled with caustic soda solution (sp. gr. 105), the wool dissolves, but the cotton is only slightly affected. Picric acid also stains wool yellow, but has no action on cotton.

There are five pounds of pure sulphur in every 100 pounds of wool. Hence silverware, wrapped up in flannel, or any other woolen stuff, will turn black.

A bit of glue, dissolved in skim-milk and water, will restore old crape.

Ribbons of any kind should be washed in cold soap-suds, and not rinsed.

A hot iron, held over varnished furniture, will take out grease spots.

SECTION XXVI.—DOMESTIC WINES, CIDER, AND PRESERVES.

RULES FOR DOMESTIC WINE-MAKERS—HOW TO PRESERVE CIDER SWEET—PRESERVING FRUITS FOR WINTER.

DOMESTIC WINE, as usually manufactured, is rather a cordial than a wine, and is entirely inferior to good grape wine; but when properly made, it will be a very healthful beverage, particularly for summer drink, when fully diluted with water.

We recommend to those who have the means, to manufacture currant wine; and let it be pure currant wine, using nothing but currants, water, and sugar, without alcohol.

There is no great difficulty in making good currant wine. White sugar only should be used. The better the quality of the sugar the better the wine will be. The idea that any sort of sugar will do for wine is pretty well exploded.

It is now also said that white currants make a much nicer wine than the red currants, but that is according to fancy.

While we admit that the true wine must be made from the grape, still, for the want of a more appropriate name for beverages made from fruits other than the grape, we call them wines. These domestic wines may be made from the currant, rhubarb, strawberry, blackberry, raspberry, and gooseberry, of passable quality. Inferior but drinkable wines may be made from parsneps and many other roots.

In the manufacture of all domestic wines, the great mistake is in the use of sugar of an inferior quality; double-refined is not sufficiently pure to manufacture either of these wines of the best quality; treble-refined sugar should be used; that of inferior kind contains gum, and after the fermentation this gum becomes fetid, and its disagreeable odor has to be overcome at the expense of the odor of the fruit, and therefore it should never be used.

Brown sugar, no matter of how good a quality, will not make wine, for when fermented, that portion which is like molasses in flavor, if separated from the sugar, as in the process of refining, becomes a rank rum, and not sufficiently delicate as the preserving alcohol of the result. When grapes are fermented, the sugar or saccharine matter is not converted into rum, but into an undistilled brandy of an unobjectionable flavor.

In making small-fruit wines, alcohol should never be added; a sufficient quantity will be produced by the fermentation to preserve the product, and any further addition injures the quality and arrests the fermentation. When alcohol is added, these wines do not improve at all by age.

The common practice of racking cider has caused many to rack fruit wines, which some wine-makers tell us is all wrong. They say:

"When the proper amount of the juice of a fruit, and treble-refined sugar in solution, is placed in a barrel with the bung loose, in a cellar of even temperature, fermentation will readily commence, and will proceed until the sugar, or a portion of it, is converted into alcohol, when it will cease. The buffy coat which rises to the surface will then settle and attach itself to the cask; the bung should then be driven in, and in six months the wine may be drawn off and bottled. No alcohol will be necessary to keep it."

Let these general rules be observed, and the following special directions pursued, and domestic wine may be made in any farmer's family of almost any kind of small fruits.

The directions given in 469 are from George H. Hite, of Morrisania, near New York, who is one of the most successful domestic wine-makers of our acquaintance.

469. **How to Make Currant and other Wines.**—"The currants should be perfectly ripe when gathered; they should be stemmed and washed before pressing, which should be done as thoroughly as possible with a 12-inch cider press. Ascertain the amount of juice thus obtained, and then add that amount of water to the pumice, and incorporate the water, and pumice well together: let it stand a few hours, and press it again. By this process an additional quantity of juice, though not so strong, is obtained; then mix the first pressing with the second, and weigh a gallon of it, and whatever it falls short of 10 pounds to the gallon, add enough of good refined sugar to make it weigh 10 pounds, and so on of the rest. I would here remark that an additional amount of sugar added to the above will make a sweeter wine, and perhaps more suitable to the taste of many.

"It would be rather an expensive business to those who have but few berries to make currant wine from the first pressing of the currant alone, as it requires one bushel of currants to produce a little over three gallons of pure juice. The red currant pure juice weighs eight and a half pounds to the gallon. The white currant juice comes almost within the wine-maker's rule, weighing nine and a quarter pounds to the gallon. The way in which I make currant wine is, to use the pure juice alone or without much water, and I find that I can readily command three dollars per gallon for it, whereas the other would be dear at one dollar per gallon, and not much of a wine at that.

"Elderberry wine is made in the same way as first stated, adding about half water in the way of re-pressing the pumice, etc., as, if it is made without the addition of too much sugar, it resembles claret very closely.

"Black currant wine is made in the same way as the elderberry, only the berries should be scalded before pressing, and if carefully managed in the fermentation, will resemble the Rhine wines.

"When the juice, sugar, and water are well incorporated by stirring together until the sugar is dissolved, it is then placed in an open tub in a temperature of about 60 degrees Fahrenheit, there to stand a few days until the froth and impurities rise to the surface, which must be removed as often as they accumulate; and when the liquid becomes limpid and somewhat transparent, then it is put in a clean barrel, filling to within five or eight inches of the bung. A tube, somewhat in the shape of a siphon, or more in the shape of an ox-bow, made of glass, is inserted into the bung about two inches, and made air-tight by means of small wedges of wood and wax, etc., the other end passing into a pail of water to the depth of three or four inches. This is done to prevent the oxygen of the air penetrating the fermenting mass, and also to retain much of the finer aromatic essences which are so essential to fine-flavored wines.

"A great advantage is also gained thereby in rendering it less necessary to keep watch over the fermentation as pursued by some in keeping the barrel bung full by replenishing with some of the juice standing near at hand, which becomes pricked before fermentation has ended, rendering it in the end little less than sweetened vinegar. No admixture should be attempted after fermentation has commenced, and if the temperature of fermentation is kept at about 60 or 65 degrees Fahrenheit for about six weeks or two months, it will be ready to remove the tube. Then fill the barrel full of the sort made in a separate vessel for that purpose, and put the bung in moderately tight for a few days, and after that drive it in tight until about December, when the wine must be racked off from the lees, the barrel rinsed with hot and cold water, and when drained quite dry, insert into the bung-hole a small cup, suspended by a wire, containing one ounce of spirits of wine or alcohol, ignited, and kept there until the barrel is well fumigated, during which the bung must not be closed. Then return the wine again and keep it there for three months, when the same process is repeated. If it is done a third time it will be all the better. It is now finished, and can be kept for any length of time, either in bottles or wood, slowly improving by age.

"Grapes may be made into wine in the same way as first mentioned above, with this difference, that when the pumice is to be re-pressed, sugar dissolved with grape-juice (by heat) must be added to the water that is mixed with the pumice, and stand a few hours before the second pressing. It must contain the same proportion of sugar and water as is found in the natural juice of the first pressing, all of which is mixed well together and fermented as above. But if the grapes are left on the vine until they are quite ripe, say until they have received the effects of a white frost, and carefully selected, the good from the bad, and thoroughly pressed and fermented as above, without the addition of either sugar or water, you will have wine worthy of the name. It is true we can not have so great a quantity of juice, but what we have is good."

We add several other formulas for making currant wine, as follows:

First. "Gather your currants when fully ripe; break them in a tub; press them through a sifter; strain through a flannel bag, and measure the juice. Add two gallons of water to one of juice, and three pounds of New Orleans sugar; stir till dissolved. Strain through a hair sieve, then a close tow linen bag, and afterward a flannel one. The juice must not stand all night. The cask must be sweet and clean, never used for beer nor cider, and if new, well seasoned. Do not fill your cask too full, otherwise it works out at the bung, which is injurious to the wine; make a quantity over and above to fill up the cask. Lay the bung on the hole to prevent flies from creeping in. In three or four weeks bung up, leaving only the vent-hole open till done working; rack off, if wanted for present use, but it is best to leave it on the lees till spring, or it may be left for two years without damage. When you draw off the wine, bore a hole so it may run off clear of the lees. Some put in spirits, but I do not think it advisable. Do not put in more than one third juice, for that would render the wine hard and unpleasant; nor too much sugar, as that would deprive it of its pure vinous taste. It improves by age."

Second. A sample which was very clear, and at two years old of a delicate, fine flavor, was made by the following rule:

Take two quarts of juice, two quarts of water, and three pounds of refined sugar; mix and let it stand two or three days; skim every day, then strain through gauze, and put into the cask and let it stand one year; then bottle, and you have an excellent wine.

Another sample, made with one quart of juice, three quarts of water and one pound of sugar, was a very pleasant drink, but would not keep as long as the other.

Third. "Before pressing the juice from the currants, pass them between a pair of rollers to crush them, after which they may be placed in a strong bag, and they will part with the juice readily by light pressure, such as a common screw or heavy weights. To each quart of juice add three pounds of double refined loaf sugar—single refined sugar is not sufficiently pure—then add as much water as will make one gallon. Or, in other words, suppose the cask intended to be used to be thirty gallons; in this put thirty quarts of currant juice, ninety pounds of double refined sugar, and fill the cask to the bung with water; roll it over until the sugar is all dissolved. This will be told by its ceasing to rattle in the barrel. Next day roll it again, and place it in a cellar where the temperature will be sure to be even. Leave the bung loose for the free admission of air. In the course of one or two or three days, fermentation will commence. By placing the ear to the bung-hole a slight noise will be heard, such as may be observed when carbonic acid is escaping from champagne or soda water. Fermentation will continue for a few weeks, converting the sugar into alcohol. As soon as this ceases, drive the bung in tightly, and leave the cask for six months, at the end of which time the wine may be drawn off perfectly clear, without any excess of sweetness."

Fourth. Take one quart of juice, three pounds of sugar prepared as above, and water enough to make a gallon; leave it in the cask one year, then draw off and bottle.

470. **Elderberry Wine.**—We have tasted of a wine made from elderberries by Alfred Speer, in New Jersey, that certainly had some excellent qualities. After preparing the juice, like that of currants, he requires four years to ripen it. His statement is:

"First year, it is kept in large casks, with valve bungs to allow the gas to escape, and at the same time prevent the oxygen of the atmosphere from coming in contact with the wine.

"Second year, racked to small casks, and moved to another building.

"Third year, drawn off in bottles and piled away in stacks, which are then completely covered with sand, kept at one certain temperature the year round.

"Fourth year, they are dug out, the wine decanted in fresh bottles and laid away, being kept in another temperature until the end of this year, when they are sealed, labeled, and packed ready for shipping.

"The principal part of the whole operation is the management of the temperature in the rooms and cellars. Each year, as the wine is drawn off into other vessels, it is moved to a building kept at a different temperature from the previous year, where it is kept uniform during the whole time by means of cool vaults or stoves, as the case and season require.

"So that after four years it becomes unchangeable, and ready for market in any climate.

"It is made from the juice of cultivated elderberries, which are made to grow nearly as large as the smallest-sized grapes, and pure without the addition of alcohol or spirits in any form."

471. **Wine from Rhubarb Stalks.**—Rhubarb will yield five times as much per acre as grapes, but care should be taken not to use the stalk too close to the leaf, as it will impart a peculiar flavor to the wine. Take a thirty-gallon cask, put in sixteen gallons of rhubarb juice, ninety pounds of sugar, and water to fill the cask. Nothing but the best refined sugar should be used if the best results are desired, and it is still better to dissolve the sugar and boil it, with the addition of a spoonful of sulphuric acid to every five or six gallons, before mixing it with the juice. This must be allowed to get cold before using.

Another formula says: "Trim off the leaves, and grind and press the stalks in any cider-mill. To each gallon of juice add one gallon of water and six pounds of refined sugar, and fill the casks, leaving the bungs out. A moderately cool cellar is the best place to keep it. Fill up occasionally, either from juice kept on purpose or with sweetened water, so that the impurities which rise to the surface while fermentation is going on, may be worked off. When sufficiently fermented, which will require from one to two or more months, bung tightly, and let it remain till winter, when it may be racked off into other casks, or bottled. Some persons refine it before bottling, by putting into each barrel two ounces of isinglass, dissolved in a quart of wine."

Cahoon's seedling yields the greatest quantity of juice. Mr. Cahoon's method of making wine is to mix equal quantities of water with the juice of the stalks, and to each gallon three and a half pounds fair quality of New Orleans sugar, filling the barrels quite full, and refining with isinglass, and allowing the wine to remain till spring, when it is bottled. By adding or diminishing the quantity of sugar, it will vary the strength of the wine in the same proportion. The pure juice, without water, makes a very strong wine by using four pounds of sugar to each gallon. Mr. Cahoon estimates that 2,500 gallons of wine can be made from an acre planted with his seedling. Sold at from $2 to $4 a gallon, this would yield a return of $5,000.

The fault of the above is the unrefined quality of the sugar. Well-made rhubarb wine will cease to ferment in about eight weeks, and then it should be corked tightly, and kept one year undisturbed before bottling. In three years it will become like a dry sherry wine.

472. **Bottling and Corks.**—Use none but strong, heavy bottles, and look to your corks if you would have your wine keep. One of the greatest mistakes made by those who are new beginners in wine-making is the using of poor corks; they do not reflect that the common cork permits the air to reach and destroy the wine. Besides this, a poor one can not be drawn without breaking, and thus injuring the flavor of the wine. If wine-makers would desire to have their wine keep well and taste well on opening, let them never use any but the very best velvet corks. The use of the best quality will more than doubly pay by securing the wine from spoiling, and retaining the flavor, which is often lost by a bad cork.

Bottles should always be stored upon their sides, or in racks, with the corks down. If poor corks are used, they must be covered with sealing-wax.

473. **Wine of Grapes.**—Most of the wine made in this country is barely drinkable; what is called pure juice of the grape is often but little, if any, better than very poor sour cider, and is not generally palatable to the common taste. In a trial of wine that I attended, a number of first-rate judges of wine finally settled upon a specimen of currant wine, as superior to any of the sweetened specimens of grape juice; yet the concoctors of it label it "pure juice of the grape," "fit for sacramental purposes and for the sick." They insist that fermentation of sugar does not produce alcohol. They are mistaken; fermentation produces it, and distillation separates it. This sugared wine is not pure—it is one fourth alcohol. Much of the imported wine is sugared. Some of the best wine can not be imported; we can not move from place to place the very best wines made of pure grape juice.

These sweetened beverages all lack one very essential element of wine, and that is the *göut*, which all genuine grape wines possess. Unfortunately, with very few exceptions, American grapes have proved so deficient in grape-sugar, that they would not make wine without adding cane-sugar, which makes rum instead of brandy, which is the true spirit of wine. Some of the best wine-makers of the country now believe that they have discovered, in the Delaware grape, one that will make wine equal to the best European varieties. Some Cincinnati Catawba is a good substitute for Rhine wine. Some good wines are made in California.

474. **How to Make Grape Wine.**—For the benefit of those who may wish to do a little in the way of domestic wine-making, we will give a few simple rules, such as are followed by wine-makers on a small scale:

MASHING THE GRAPE.—There are various methods of mashing the grape now used by the more careful wine-makers. Previous to the mashing, however, when first-rate wine is to be made, the bunches are carefully examined, and all unripe and rotten berries are plucked off and thrown away; then the grapes are thrown into a tub and mashed by tramping with the feet, or bruised with a club, or crushed by passing between two large wooden rollers, which are far enough apart to allow the seeds to pass without being broken. The seeds, if mashed, would give a bitter taste to the wine. To tramp grapes, wear India-rubber boots.

PRESSING THE GRAPE.—The pressing of the mashed berries is a simple process, like the pressing of cheese, or apples for cider. The grape-press is usually made to hold about 150 lbs. of grapes at each pressing. If white wine is to be made, the grapes are pressed as soon as mashed; but if red wine is wanted, the whole mass is left to ferment for six or seven days, in which time the juice takes the dark color of the skin.

FERMENTATION.—The juice for white wine, as it comes from the press, is put into pipes measuring 140 gallons, about 115 gallons of juice being put into each cask, leaving one fourth of it empty. The bung-hole is left open, and in two or three days the fermentation begins, and its force is over in three or four days. The wine-maker then proceeds to fill up the casks, gradually pouring in six or eight gallons at a time, so that the casks are filled in the course of three or four days more. The casks should be filled up before the strength of the fermentation is over, so that the dirt or scum may be borne up to the bung-hole and there thrown out.

RACKING.—The vigor of the movement being over, the bung-hole is closed and the wine is left for a period varying from four weeks to three months. It is then drawn off through a cock placed a couple of inches above the bottom of the pipe, taking care not to disturb the sediment at the bottom. The clearer wine is poured into a clean cask; that filled with sediment is filtered through a doubled cotton cloth, and is then mixed again into the first drawing, or it is used without filtration in making brandy. About one twentieth of the juice as it comes from the press falls down as sediment. The process of transferring wine from one cask to another is termed "racking off."

After the first racking, the new cask is completely filled, the bung closed, and the wine is not disturbed till March or April, when it begins to feel a more lively fermentation, for that process never ceases entirely. When the vine sprouts in March or April, and when it blossoms in June, and the grape ripens in September, the new wine ferments; and at those times the bungs must be raised, and care must be taken not to disturb the barrels. Between times, when there is no perceptible fermentation, the wine should be racked off two or three times in a year, and at the end of a year and a half it is clear and good, but it continues to grow better with age. The red wine is treated in precisely the same manner, except that it is allowed to ferment before pressure. Immediately after the pressure the wine should be placed in as cool a cellar as can be obtained in the country, and should be kept there always. This cellar should have no moldy matter about it, no vegetables or salt meat in it, nor anything that can corrupt the natural sweetness of the air.

RED AND WHITE WINE.—BRANDY.—All the white wine made in this manner resembles hock or sauterne; the red wine may be made to resemble claret, burgundy, or port. When the berries are picked early, the red wine is like claret, but has more body; if the grapes are left upon the stem until they are nearly dry, they give less juice, but the wine has a much stronger body, and rivals port in strength.

The method of making champagne is held as a secret, and we shall not attempt to describe it fully. The main facts, however, are that the wine is bottled about six months after pressing; it is again re-bottled in eight months more. The bottles are laid down upon their sides in racks, and a large per-centage of them are broken by the activity of the fermentation.

The refuse of the press and all the sediment of the new wine may be used in making brandy, which is obtained by distillation in the same manner as whisky is distilled from maize or potatoes. For every hundred gallons of wine about twenty-five of brandy are obtained.

475. **Wine of Tomatoes.**—We have no experience of wine from this fruit, but a lady writes us from Iowa as follows:

"Are you aware what very excellent wine can be made from tomatoes? I tried it on a small scale last year, and find it serves as good a purpose for using in sickness and in cooking as the compounds of nauseous drugs usually sold for wine. Many who have tasted it were unable to tell it from grape wine. If people will use wine, it is certainly well to have it free from poison, and tomatoes are so abundant that it could be afforded cheaply. If vinegar can be made from it, it will be a blessing to the West, where we have such horrible compounds under that name. The recipe: One pound of white sugar to a quart of juice, and similar treatment to currant wine."

476. **Blackberry Cordial.**—This is not wine, though an article called blackberry wine is often made in the same way that wine of other small fruits is made, and is a very good beverage; but this is what the name implies, blackberry cordial, and it should be provided in every family, particularly where there are growing children; it is such an excellent remedy for children troubled with diarrhea and all other diseases of the bowels generated

in the spring season. To make it, to two quarts of blackberry juice add one pound of loaf sugar, half an ounce of nutmeg, half an ounce of cinnamon, pulverized fine, quarter of an ounce of cloves, quarter of an ounce of allspice, finely pulverized, and a handful of raisins. Boil all together for a short time, and when cold, add one pint of fourth-proof French brandy. Black currants also treated in the same way make an excellent cordial. See 472.

477. **Cider—Preserving it Sweet.**—The following is the plan recommended by Professor Horsford, of Cambridge, Mass.:

"When the cider in the barrel is undergoing a lively fermentation, add as much white sugar as will be equal to half or three quarters of a pound to each gallon of cider, and let the fermentation proceed until the liquid attains the right taste to suit; then add an eighth to a quarter of an ounce of sulphite (not sulphate) of lime to each gallon of cider in the cask; first mixing the powder in about a quart of the cider, and then pouring it back into the cask and giving it a thorough shaking or rolling. After standing bunged up a few days for the matter added to become incorporated with the cider, it may be bottled or used from the cask."

Do not mistake sulphate of lime—which is a natural production, and known as plaster of Paris—for sulphite of lime, which is a manufactured article, and is worth by the barrel about thirty-three cents a pound, and by the cwt. thirty-seven and a half cents, and by the single pound fifty cents. It has been of late years much used by sugar-makers to prevent fermentation of cane-juice, and in our opinion it will be found more effective as a preventive of fermentation in cider than an arrester of it after it has proceeded nearly to completion.

We kept cider on tap that was treated as above for six months, which appeared to possess exactly the same degree of acidity as it had when first treated, but it had an unpleasant sulphur taste.

USING HEAT AND BOTTLING.—The following is the formula: Fill bottles with sweet cider and set them on a board in a flat-bottomed boiler with cold water, which heat to the boiling-point until the cider begins to run over, but not to boil so as to alter its flavor; then cork and seal just as fruits are treated, and the cider will keep equally well.

CONDENSED CIDER is the name of a new article first made by Gail Borden, Jun., in 1863, using the same process which he invented for condensing milk; that is, boiling it in vacuum with steam-pipes, reducing the cider direct from the press to a stiff jelly, which will keep as well as any fruit-jelly made by domestic process. For transportation it is put up like the condensed milk, in tin cans. It is reduced to its original condition by adding as much water as it had parted with. It is, probably, the best plan ever devised for keeping cider sweet.

478.—**Oiling Cider.**—When a barrel of cider is tapped, it grows hard; that is, more and more acid, until it gets too hard to drink, if it is kept long on tap. This is occasioned by the air, which fills the cask above the cider as fast as it is drawn out. The air can not be excluded, even if the cask were air-tight, because the cider will not run from the tap if there is no air to press it out. If cider is exposed long to air, it will become vinegar. In fact, the way to make vinegar of cider is to expose it to the air as much as possible. To prevent the cider on tap from becoming acid, it is recommended, as soon as one or two gallons are drawn out, to pour in the bung-hole about half a pint of clear sperm oil, or sweet oil if it is preferred. It should be warm when poured in, and it will spread in a thin coat over the surface, and keep spreading as the cider is drawn down, and thus exclude the air, without giving any taste of oil to the cider.

This plan of preserving cider is worthy of further attention. We have faith in it from knowing that oil-casks are the best we know of for storing cider, imparting no flavor, and keeping it sound as bottled cider for years. Sperm-oil casks are more valuable for cider-casks than for any other purpose.

479. **Filtering Cider.**—Cider is very much improved by filtering. This should be done when the first fermentation is over, by racking it off into clean barrels. A good plan for a filter is the following:

"Take a square or round wooden box, made of inch pine plank, three feet in diameter, and one foot four inches deep. Make it with a bottom perforated with numerous one-quarter-inch augur holes, over which should be laid coarse hemp bagging. Now fill in the box for eight inches with pieces of charcoal—animal charcoal is the best—about nut size, and on the top of this place a four-inch layer of clean washed sand, and cover all with coarse hemp bagging, and you have a cheap and good filter. Any number of such filters may be used, according to the quantity of cider to be operated upon, and the cloth can be frequently washed without disturbing the sand and charcoal. Before any cider is filtered through, pass a stream of clear water into the filter for fifteen minutes, so as to remove any fine, loose particles of charcoal that otherwise would be mixed with the cider."

480. **Aerifying Cider.**—If cider, when it first comes from the press, could be filtered, and the clear liquid allowed to fall from an upper story in a thin stream into a large tub in the story below, or, if feasible, to continue falling from one to another through several stories of a building, it would become greatly improved, and we are assured by one who has tried it, that it may be bottled at once without any further fermentation, and it will remain in its sweet or slightly acidulated state, and when at a year old it is uncorked it will sparkle like champagne wine.

The grand secret of having a cider equal to pure wine is in checking any further fermentation. If the cider is left to itself, the acetous fermentation follows—the sedimentary matter at the bottom of the cask rises, and the liquid becomes muddy—this, acting as yeast, produces a second and more violent fermentation, resulting generally in hard cider.

By straining out the crude and useless matter from the liquor, the liability to excessive fermentation is greatly lessened, and so it is by fumigating casks with burning sulphur as well as aerifying. Remember, however, that this airing process must be confined to cider while quite new. If fermented cider were treated in the same way, the result would be vinegar.

When cider is kept tightly bunged up, it changes little and very gradually; bottled, it changes none at all, except a certain improvement by age which takes place.

Air will at once begin to change the alcohol into vinegar if it comes in contact with it, and this will make the best cider hard and sour before long.

481. **Vinegar—How to Make it.**—If you have cider that "won't turn to vinegar," just try the following plan: Fill a barrel, tub, box, or any other clean vessel, with clean shavings, or small twigs of any sweet wood, such as maple, birch, beech, etc., and wet them with vinegar, if you have it, and if not, cider, or even warm water will answer. This barrel must be full of holes, sides and bottom, and set over a larger vessel, to catch the drip as it leaches through. The cider is to be conveyed to the leach by any convenient method. A good way is to put it in a pail, set on the barrel over the shavings, and carry it over the edge by siphons, made of rags, or cotton lamp-wicking, or a hank of cotton yarn. These conductors should be cut long enough to reach from the bottom of the pail or pan used, up over the edge, and down an inch below the bottom. This gradual emptying of the pail, and trickling down through the filter, exposes the liquid to the atmosphere, and that is what is wanted to make vinegar. If the first operation is insufficient, let it be repeated, and good strong vinegar will be the result.

CURRANT VINEGAR.—"Last year," writes a lady, "for trial, I took fourteen pounds of currants, mashed them as for wine, put them into a tub with two or three pails of water, stirring it two or three times a day. After standing several days, I strained or pressed it, and with molasses enough to make it as sweet as new cider, I had ten gallons. I put it into a keg, and did not open it till December, when I found it to be as good vinegar as was ever made."

Blackberry vinegar may be made in the same way; or, if you are making wine, do not throw away the seeds and skins after drawing off the must. Pour warm water over these until they are entirely covered, and let them stand in an open vessel three or four days. Then draw off the liquid and let that stand until the acetous fermentation takes place. A small quantity of coarse sugar or molasses will hasten the process. In this way a most excellent article of wine vinegar may be obtained by many who have not the means of making cider vinegar.

482. **Preserving Fruits for Winter Use.**—We have already given a plan in 337 of a fruit-drying house, and have recommended preserving various kinds of fruits by drying for winter use, and now we give some directions for various other preparations for preserving fruit, cooked and uncooked.

Apples keep best in a dry, cool room, just above the freezing-point. If headed in barrels, apples will keep in a room where water would freeze quite solid. They will not keep well in a warm cellar where cabbage, turnips, or any strong-smelling substances are stored, for they absorb the unpleasant odor. If packed in straw or chaff that becomes damp and musty, they will spoil.

483. **Grapes—How to Keep Them.**—There are three easy ways that will serve the purpose in some degree—that is, it will preserve them some weeks into the winter in a tolerable state of freshness. The first is to hang up the bunches separately by the stems in a dry room, barely warm enough to preserve fruit from freezing. The next is to pack the bunches, each separately, in absolutely dry sawdust, of some sweet wood, in layers, in a box or cask. The other is to pack the bunches separately between layers of clean cotton fiber or batting. In each case the fruit should be kept in a dry, cool room, and, when packed in cotton, the room may be so cold that it would freeze water, yet will not injure the grapes. Care must be taken that the fruit is dry and clean, and that there are no decayed, mashed, or imperfect grapes on the bunches.

Another direction says:

"In gathering grapes for keeping fresh, they should be allowed to hang on the vines until fully ripe, and then gathered with care to avoid bruising. The fairest bunches should be chosen to put away, and with a pair of small scissors all defective and bruised berries should be cut off. They should then be placed in boxes well ventilated, and remain for a few days, when they should be packed in boxes holding six or eight pounds each. It is not important that the box be tight; it is better that it should not be. These should be put in the coolest place in the house, where the air is dry. On the approach of freezing weather they may be removed to upper shelves suspended in the cellar, or in any dry room where the temperature is as near the freezing-point as possible.

"While grapes may be grown in such profusion and with so little labor, it is a little remarkable that a supply for every household in the country is not secured, not only in the regular season of them, but to last until spring. There is no trouble in keeping grapes through the winter as fresh as when they are first gathered."

484. **Preserving Fruit in Air-Tight Cans and Bottles.**—The *modus operandi* of putting up fruit so as to preserve it in a fresh state without cooking, drying, or packing in sugar is not yet fully understood by all farmers' families, though largely manufactured for sale by many persons in cities; and many contrivances have been invented for sealing up cans, some of which are very convenient; but the same thing can be accomplished with bottles corked and sealed according to these directions.

It is a business that can not so well be done in families as in large manufactories, where everything is arranged for convenience; but still, with a little experience and careful attention, every family can save enough of the various fruits of the season to furnish their tables with a great delicacy during that portion of the year when they can get nothing of the kind. The whole secret consists in expelling the air from bottles or cans by heat, and then sealing up the contents hermetically. If the article to be preserved is peaches, select such as you would for sweetmeats, and pare and cut them so that they can be put in the bottle, and you must do this with the least possible delay, or they will be colored by the atmosphere. Some persons who want them to retain their natural whiteness peel them under water. When the bottle is full, cork it tight and wire down the cork with very little projecting above the glass. When you have bottles enough to fill a kettle, such as may be most convenient, put them in and boil with the water all around up to the nozzle for about fifteen or twenty minutes, or until the bottle appears to be full of steam, the atmosphere having been forced out through the cork. As soon as the bottles are cool enough to handle, dip the corks in sealing-wax, so as to cover them quite tight. An additional precaution is used by some in putting tin-foil over the wax.

Another plan is to cook the fruit slightly in a kettle, and then put it into cans or bottles, and pour hot syrup of sugar in to fill up the interstices, and then cork and seal, the heat of the fruit and syrup answering to expel the air. But the less they are cooked or sweetened, the more natural will be the taste, like fresh fruit when opened. We have eaten peaches a year old that we could not tell from those sugared ten hours before.

Tomatoes are very easily preserved, and retain their freshness better than almost any other fruit. The small kind only are used. Scald and peel them without breaking the flesh. Bottles should hold about a quart only, because when once opened, the contents must be used up at once. Bottles made on purpose, with large throats and a ring on the inside, are the best, and bottles are better than cans for all acid fruit. The cans, however, are more easily secured by solder than the bottles by corks and wax, as the air is let out through a small puncture after the large opening is soldered up and cans heated, and that hole stopped with a single drop of solder.

Every article of fruit will keep fresh if the air is exhausted and the bottle sealed tight. The least particle of air admitted through any imperfection of the sealing will spoil the fruit. If the air could be driven out without heat, there would be no need of any cooking, and only just enough should be given to expel the air and not change the taste. Many persons prefer to add syrup made by about one pound of sugar to a quart of water to all suitable fruits. Green corn, beans, peas, tomatoes, pie-plant, currants, gooseberries, cherries, plums, raspberries, strawberries, peaches, are the most common things put up in this way. They add greatly to the pleasures of the table and to the health of those who consume them—in that respect quite unlike the common preserves.

We have known fruit for pies put up in three-quart cans by partially cooking in an open kettle in a syrup just sweet enough for use, and putting the fruit in the cans hot and soldering immediately. It kept thus perfectly.

Some fruits keep much better and with less heating than others. Peas are among the hardest articles to keep, they contain so much fixed air.

We advise every family in the country to try this plan of putting up fruits for winter use on a small scale this year, and if successful, enlarge upon it next year

A new mode, to us, of canning fruit is recommended as follows:

"Take a common wide-mouthed crock or jar of any size; prepare the fruit in the usual way; fill the jar and tie two waxed cloths tightly over the mouth. The jar must not be very narrow-mouthed in proportion to its size. A common, straight, stone gallon jar is of good proportions. If the mouth is too small, the cloths can not follow the surface of the fruit down in a cold time. The cloth must touch the fruit at all times, and if the mouth is wide it can rise and fall with the weather. In order to have the jar very full, it is well to let the fruit cool down a little below 212 degrees; then fill up with more fruit just before putting on the cloth. The cloths may be of the common muslin, but they must be soaked in melted wax. The wax should be beeswax chiefly; a little rosin and tallow will help it."

485. **Dry Sugar-Preserving.**—Strawberries, raspberries, blackberries, cherries, and peaches can be preserved in this manner: Lay the ripe fruit in broad dishes, and sprinkle over it the same quantity of sugar used in cooking it. Set it in the sun or a moderately heated oven until the juice forms a thick syrup with the sugar. Pack the fruit in tumblers, and pour the syrup over it. Paste writing-paper over the glasses, and set them in a cool, dry place. Peaches must be pared and split, and cherries stoned. Preserved in this manner, the fruit retains much more of its natural flavor and healthfulness than when cooked. The paper which is usually pasted over jars of preserves is porous, and admits air. To render it perfectly impervious to air, apply the white of an egg with a brush to the paper before covering the jars, overlapping the edges an inch or two.

486. **Dry Pressure Preserving.**—By submitting vegetables to a powerful pressure, they have been prepared in France so that they have been kept in a dry state many months. Cabbages, beets, parsneps, peas, apples, etc., are divested of all moisture by a powerful hydraulic press, and thus are packed in small compass for use of men on ship-board. They are a tolerable substitute for fresh vegetables, but as unlike them as bull beef is to tender lamb. Upon such a voyage, however, as that of the Grinnell expedition, where the ships were frozen up nine months, a taste of such food as this would have been not only palatable, but extremely beneficial to health. We understand it is not expensive.

487. **Currant Jelly.**—As currant jelly is pleasant and useful to both the sick and the well, we give the following directions for making it of excellent quality, which retains the beautiful crimson color of the currant much better than that made by the old mode: "Squeeze the juice out of the currants, strain and measure it, put it in a porcelain or very well-cleaned copper or brass kettle, and boil it until the scum ceases to rise; then, without taking the juice off the fire, stir in one pound of well-refined sugar to every pint of juice, and as soon as the sugar is fully dissolved—which will be

in less than a minute—take it off and pour it into the vessels prepared to receive it."

CIDER JELLY.—Boil three quarts of cider just from the press till it is reduced to one. Skim well, and add not quite one quart of white sugar. Boil fifteen or twenty minutes, and strain through a coarse linen cloth into your jelly glasses.

488. **Pickling Cucumbers, Melons, Tomatoes, Peaches.**—The great art in making good pickles is to have good vinegar. The best vinegar for pickling is made of sound cider. As good vinegar is not always at hand, the best way is to prepare a brine strong enough to bear an egg. When the tub is full of pickles, allow the brine to cover them; then cover them over with cabbage-leaves, and a board and weight to keep them in the brine. For use, freshen in warm water, and put them in a bright brass kettle, with vinegar enough to cover them, and scald them fifteen or twenty minutes; put them in jars, and pour hot vinegar over them; flavor them with cloves, mace, black pepper, an onion or two, and a little horseradish and ginger.

FOR PEACH PICKLES.—Stir two pounds of white sugar into two quarts of the best cider vinegar. Boil it ten minutes, skimming it well. Have ready some large, fully-ripe peaches; rub them with a clean flannel to take off the down, and stick four cloves into each. Put them into glass or whiteware jars, rather more than half full, and pour on them the vinegar boiling hot. Cover them closely, set them in a cool place, and let them rest for a week. Then pour off the liquid, and give it another boiling. Afterward pour it again on the peaches; cover them closely, corking the jars and tying leather over each, and put them away till wanted for use. Instead of cloves you may stick the peaches with blades of mace, six blades to each peach. If you find a coat of mold on the top of a jar of pickles, remove it carefully, and do not throw away the pickles, as they may still be quite good beneath.

489. **Apples, how Preserved, and their Use.**—Where apples abound, as they do in a large portion of the Northern States, they should be found in some form upon every farm-house table at nearly every meal. Several very choice sorts can be kept through the winter up to the time when apples come again; and where they abound, there is really but little occasion for preserving small fruits, as indicated in preceding paragraphs. Apples, when first taken from the tree, if laid in a heap eighteen inches in depth, and covered with a cloth, or a little straw, will soon sweat and become quite moist; then the cover or straw should be taken off, and the apples suffered to dry as suddenly as possible. Then packed in barrels and kept till they sweat again, and finally dried, repacked, and stored in proper situations, they will always be ready for furnishing some of the best sweetmeats at short notice that a farmer can enjoy, for they furnish healthy food.

Apples brought to the table raw should be only such kinds as can be eaten after sweet things, as pastry and custards, hence all intensely sour apples, however grateful at other times, are not fit for the dessert. There is almost an infinite number, and among them our best varieties, which do not come within this stricture, though some of the choicest for culinary purposes are too sour for the dessert uncooked.

The effect of heat on many apples is quite noticeable. Baked apples are always liked. We are not surprised when a tender apple bakes soft and delicate, but when one tough and corky loses all these characteristics, and surpasses in delicacy even the other, as is often the case, we appreciate better the chemical action which heat induces. Sweet apples, free from decay, worms, or gnarly spots, scrupulously cleaned and placed in pans, and baked in a slow oven till fully done, are excellent. The apples should shrivel and dry away very much, and the skin should not be broken so as to let the juice out. The sweetness is thus concentrated, and they are three times as good as if simply baked through.

Sour or tart apples may be baked much quicker; the juice, instead of becoming viscid and thick by heat, is apt to flow out, or the steam splits the skin and lets it out, and it is likely to burn to the pan. Baked tart apples should be eaten with sugar, or they may be baked with sugar. Tart apples, washed, placed in a pan with a little water, and sprinkled over well with sugar—or the same, cored and the holes filled with sugar—or pared as well as cored, and spice added with the sugar, are delicious. Some use one or two cloves to each apple, or a bit of cinnamon with some lemon-peel; others grate nutmeg or sprinkle cinnamon over the apples in the pan.

To our taste, plain baked apples, or slightly sugared if very tart, is the very best preparation of this valuable fruit for the table.

Apple Custard.—To make the cheapest and best every-day farmer's apple custard, take sweet apples that will cook soft, pare, cut, and stew them; when well done, stir till the pieces are broken; when cool, thin with milk to a proper consistency, and bake with one crust, like a pumpkin pie. Eggs may be prepared and added with milk, though it will do without. No sweetening is necessary. It may be seasoned with any kind of spice to suit the taste—the less the better.

Raw Apples and Milk.—A tender sub-acid, or sweet apple—the latter preferable—pared and sliced thin into a bowl of milk, for breakfast or supper, is a great luxury to some persons at any time of the year; and it is not less healthful than grateful to the palate.

SECTION XXVII.—HYGIENIC.

PREPARATION OF FOOD FOR THE SICK—REMEDIES FOR POISONS, BITES, AND STINGS.

WE will not tire the reader with nostrums under this title; we simply ask attention to a very short section upon matters of great importance to those who are suffering, and which come properly under the head of this chapter. All of our readers who have, while recovering from sickness, asked, "What shall I eat?" will appreciate all that is said in the next paragraph.

490. **Food for the Sick and Dyspeptic.**—Sickness occurs in every family, and during convalescence the appetite is sometimes so delicate it needs a good deal of pampering. In some families there is always an invalid, who can not eat the every-day food of those whose appetites are strong. To such, some of the following hints may be very acceptable, and equally acceptable to some who are not sick.

What shall I eat? How often this question is asked by the sick, or those with delicate appetites! Nature demands food, but the appetite does not crave it, and the mind of the feeble invalid can not fix upon anything that he will relish.

It may relieve such sufferers to point out a few suitable articles of food, such as are easily prepared and usually tempt delicate appetites.

Here is one peculiarly New Englandish:

"Cut some codfish in bits the size of a pea, and boil it a minute in water to freshen it. Pour off all the water, and add some cream and a little pepper.

"Split and toast a Boston cracker, and put the above upon it. Milk and a little butter may be used instead of cream.

"Ham or smoked beef may be prepared in the same way. For a variety, beat up an egg and stir it in, instead of cream, or with the cream.

"These preparations are also good for a relish for a family breakfast or tea."

Another excellent dish for sick or well, and economical withal, is made by taking a few cakes of pilot-bread and soaking them till partially soft, after breaking them into mouthfuls, in just water enough to be all absorbed; then cut a slice of fat salt pork into very small pieces, fry it crisp, pour it over the bread, and heat the whole in a stove or oven, or in a spider.

Another plan is to pour over the bread a sweetened butter gravy, or wine sauce, or the juice of stewed fruit or preserves. All are good.

A very excellent food for delicate stomachs may be made by sweetening water, cold or hot, with refined sugar, and crumbling into it stale bread.

Bread and cider used to be a favorite food in Yankee land in old times. Sweeten the cider, and crumb into it toasted bread.

Sometimes a piece of codfish or a slice of fat salt pork, roasted upon live coals, will tempt a convalescent appetite when nothing else will answer.

In making porridge of corn or oatmeal, be careful to cook it well. Do not think it done till it has boiled an hour.

Rice gruel does not need so much cooking. It should not be given to a person of constipated habits. Simple boiled rice is a delicate food for the sick.

Arrowroot, tapioca, farina, and corn starch are all of the same character—highly concentrated food. A good gruel may be made of either, and flavored with sugar, nutmeg, lemon, or whatever would be agreeable. Stale bread, very dry, crumbed and made into a gruel, is perhaps the most digestible. Stale bread, toasted very dry and brown, and then steeped in water a long time, makes a good drink for the sick, and furnishes considerable nourishment.

In all cases of sickness, when the appetite craves fruit we would give it, ripe and fresh in its season, or preserved and cooked in the most simple manner. Apples for the sick should always be roasted. So should potatoes.

If the friends of the sick possess a little skill and neatness in the preparation of dishes, the patient need never say, "What shall I eat?"

The following is well relished by some appetites, but we doubt its digestibility: Shave a good crisp head of cabbage as fine as possible; add a tablespoonful of horseradish to each quart of shaved cabbage; let one pint of vinegar come to a boil; have ready three well-beaten eggs with a little salt; pour the eggs into the vinegar and stir until cooked; then pour it over the cabbage and set it away, as it is better when cold. This will keep some days, and is always ready.

Roasting a Chicken may be thought a very simple operation, but, in our opinion, not one in ten of modern housekeepers can do it to perfection. First, because they have no conveniences. The abominable cooking-stove has spoiled many a dish, and none more so than this of a roast chicken, which never has been and never will be roasted to perfection in any other way than tied up by the legs swinging by a string before a wood fire, dripping its gravy into a pan in which there is a little cream and a lump of butter, with which the roast is to be basted from time to time until the skin is brown and flesh thoroughly cooked. It is this cooking in the open air that gives it the peculiar richness. If a chicken must be roasted or baked in a stove-oven, it should be done with the oven door open. With some stoves it can be much better done in an open pan set down before the grate. All holes in the body of a fowl should be sewed up as tight as possible—not merely drawn together, but tight.

A badly cooked fowl should never be set before an invalid, or one whose digestion is naturally weak. The following makes a nice dish for a delicate appetite:

Lay half a dozen crackers in a tureen; pour enough boiling water over them to cover them. In a few minutes they will be swollen three or four times their original size. Now grate loaf sugar and a little nutmeg over them, and dip on enough cream to make a nice sauce, and you have a simple and delicious dessert that will rest lightly upon the stomach, and it is easily prepared. Leave out the cream, and it is a valuable recipe for "sick-room cookery."

Lemonade.—Three lemons to a pint of water makes strong lemonade; sweeten to taste. This is a cool, refreshing, pleasant, and salubrious beverage for invalids.

Mead.—Three pounds of sugar, five gills of molasses, three pints of water, three ounces of tartaric acid, one ounce of sarsaparilla. Stir it over the fire till at the boiling-point. When cold, bottle and cork tight. Add the supercarbonate of soda when you drink it.

Ginger Beer.—Two gallons of boiling water, two pounds of crushed sugar, one and a half ounces of bruised ginger, one ounce of cream of tartar, one lemon, two tablespoonfuls of yeast. Mix all together (except the yeast) and let it stand over-night; then add the yeast; strain and bottle it; tie down the corks. In twelve hours it may be drank.

Beef Tea is very nourishing if rightly prepared. Take perfectly lean parts of fat beef, cut it into cubes half an inch square, and soak it some hours in cold water, and then boil all together for an hour. You may improve this by adding a toasted cracker to each bowlful.

The following formula is given by Liebig: Half a pound of fresh, lean beef, cut small in one pint and a third of pure water, with four drops of muriatic acid and half a small spoonful of salt, to stand an hour cold, and then strain without squeezing. It may then be cooked and taken hot or cold

Mutton or chicken tea should be made according to the first of the above directions, and rice may be added, if not intended solely for drink.

491. **Cautions about Preserving Health.**—The art of preserving health is of more consequence than all the prescriptions for pampering sick appetites. A great deal of sickness might be avoided by forethought. There is always some cause to produce sickness, and that cause may frequently be removed by a few hours' labor.

Stagnant water in the cellar is a great breeder of disease. Let there always be a free passage of air through the cellar by taking out the windows, so that the air can circulate freely and keep it healthy.

If there are stagnant ponds near your dwellings, they should be drained. Remove, as far as you can, every cause of disease; be temperate and regular in all your habits; avoid exposure, and be careful of what you eat.

492. **Poisons.**—There are numerous poisons lurking unsuspected about many dwellings that tend to produce sickness. Among other poisons, we enumerate—

Oxalic acid used in solution for cleaning brass and removing stains from linen, is a virulent poison. Lime forms an insoluble compound with it, and proves the best antidote when it has been taken into the stomach.

Among vegetable poisons we find the mountain laurel (*Kalmia latifolia*), and the dwarf or sheep laurel (*K. augustifolia*). These not only are eaten by animals, but the leaves are mistaken by children for wintergreen, and we have known serious cases of poisoning to result.

Poison sumach (*Rhus venenata*) and poison vine or poison ivy (*R. toxicodendron*) produce excessive irritation of the skin, and even blistering from contact with most persons, and some are so sensitive that the odor only of the first or its smoke in burning produces most painful results. The wild or poison parsnep has a similar effect upon some persons, and some very delicate skins are affected by the garden parsnep. The effect is hightened when the leaves are covered with dew; when dried, they may be handled with safety.

Water hemlock (*Cicuta maculata*) is a virulent poison. From the form of its inflorescence and the aromatic odor of its seed and root, it is sometimes mistaken for sweet cicely (*Myrrhis odorata*) by children. Pains should be taken to extirpate it wherever found, as also to prevent the spread of a similar plant, a foreigner, poison hemlock (*Conium maculatum*).

Among poisonous garden flowers we have the larkspur, monkshood, and foxglove.

Opium, the product of the poppy, in some form, either as laudanum or elixir, is a very frequent means of poisoning. These medicines are too powerful to be trusted in ignorant hands, as the yearly record of fatal accidents sadly attests.

The green color on wall paper and on cards attached to various dry goods, often contains arsenic, a single square inch having enough to destroy a child. Green wall paper is unfit for use, especially for sleeping-rooms. The exhalation from such walls has been known to sicken the occupants.

The frequent use of poisonous colors upon candy or children's playthings indicates the need of the utmost caution on the part of parents. The red, green, yellow, and blue colors may all be harmless, but fatal cases of poisoning and the examination of chemists prove that the grossest ignorance or the deepest depravity prevails with some makers and venders.

Copper in all its forms is poisonous. Acid or greasy food allowed to stand in copper or brass vessels, readily corrodes them, and proves their unfitness for such uses. The metallic or brassy taste of the articles usually affords reasonable warning.

Common black writing-ink, made of nutgalls and iron, is not poisonous, but the blue ink has a different composition, and is so in a greater or less degree. Indelible ink and also hair-dyes having nitrate of silver as the essential ingredient, are poisonous. Corrosive sublimate used in alcohol as a bedbug poison should never be kept in families, as it has been the cause of very many accidents.

Phosphorus, an ingredient in friction matches, is a deadly poison. Too much caution can not be used to keep them away from small children, who will put anything in their mouths. The free use of warm water will not only favor the vomiting which may ensue from the action of the poison itself, but as a diluent it may serve to weaken its power and render it comparatively harmless. Common table-mustard is a very prompt emetic. The dose is a teaspoonful of dry mustard; stir this in a tumbler of water and drink at one draught. It is quick, sure, and as agreeable as any emetic. If some does remain in the stomach, it does no harm. In a few cases some antidote may neutralize the poisonous substance in the stomach, but the main dependence must be in removing immediately its contents either by an emetic or, better, by the stomach-pump. Vegetable acids, as vinegar, are good antidotes to many of the vegetable poisons, yet no rules can be given upon which it would be safe to rely without medical assistance.

493. **Bee Stings and Mosquito Bites.**—We have often cured the poison of bee stings, and relieved the pain almost instantly by an application of spirits of hartshorn (liquid ammonia). If that is not convenient, wet the skin and apply powdered saleratus or sal soda, which effects upon some persons instant relief. The same things may be applied with success to mosquito bites upon children or others, where they are particularly poisonous. Somebody has published a statement that, if a piece of raw beef is placed in a room infested with mosquitoes, they will all suck the beef and let folks alone.

494. **Snake Bites and Remedies.**—The most virulent and fatal of all poisons, excepting always the poison of bad ventilation, comes from snake bites, which occur occasionally in some of the new settlements of our country. We have known death to supervene in several cases for want of a little knowledge of remedies ready at hand. One remedy is to drink whisky, or any spirit, as soon as possible, sufficient to produce insensibility. Another remedy is to kill a chicken, or any other animal, and cut it open and apply the warm flesh to the wound, holding fast, and renewing it when it loses the animal heat. Another is a poultice of equal parts of raw onions, tobacco, and salt, mashed together, moistened with whisky, and bound on tight and frequently renewed. Sweet or olive oil, we know as a very valuable remedy, taken in half-gill doses, and cloths bound upon the bitten spot soaked in oil. We earnestly recommend a trial of the following remedy: Wet a bunch of lint with a teaspoonful of chloroform, and lay it on the bite, and cover it with a watch crystal, a wine-glass, or a tumbler, pressed down so as to exclude the air, and hold it there fifteen to thirty minutes, which will probably raise a blister, and prove so painful that the pain of the poison will not be felt.

495. **Hydrophobia—Cure of Mad-dog Bites.**—A Leipsic—Germany—journal

gives the following, said to have proved many times a sure remedy for the bite of a mad dog:

"Take immediately warm vinegar or tepid water, wash the wound clean therewith, and then dry it; then pour upon the wound a few drops of hydrochloric acid, because mineral acid destroys the poison of the saliva."

Brazilian Mode of Cure.—We have seen it stated that the bites of rattlesnakes and mad dogs and stings of scorpions are cured in Brazil by the use of spirits of hartshorn. It should be applied immediately, if possible, and the wound kept wet by cloth application or continual sponging, and doses of the spirits diluted, taken into the stomach three or four times a day. It is said that the spirits of hartshorn has a chemical affinity for the poison virus, and absorbs and decomposes it, and thus renders it harmless. If this is the case, then ammonia in any form would have the same effect. At any rate the remedy is simple and easily tried, and should be tested. We have faith in it, knowing it to be an excellent remedy for a bee sting.

496. **Remedies for Lockjaw, Felons, and Ulcers.**—We have heard a great deal about the medicinal value of a poultice made of grated beet-roots, and now we find the following statement, which we consider worthy of attention, the remedy is so easily applied:

"A young lady ran a nail into her foot, which produced lockjaw of such a malignant character that her physicians pronounced her recovery hopeless. An old nurse applied a poultice of pounded beet-roots, renewing it often, and the result was a complete cure."

A good remedy for a felon is made of common soft soap and air-slaked lime, stirred till it is of the consistency of glazier's putty. Make a leather thimble, fill it with this composition, and insert the finger therein, and our informant says a cure is certain. This is a domestic application that every housekeeper can apply promptly.

A fig heated as warm as it can be borne, and cut open and applied to almost any ulcerated sore, and renewed as it cools, is recommended for boils and similar affections as one of the best remedies. It may be applied to an ulcerated tooth.

497. **Remedy for a Tight Finger-Ring.**—If it can not be removed by such mechanical appliances as inserting a stout thread under it and pulling upon it, nor by thin strips of metal, then chemistry must be resorted to, and the strength of the ring destroyed, so that it can be easily broken. This is done by rubbing it with quicksilver, which has an affinity for pure gold, and makes it brittle.

SECTION XXVIII.—THE DAIRY.

BUTTER-MAKING, AS PRACTICED BY FIRST-CLASS DAIRYMEN—CHEESE AND CHEESE-MAKING.

WE can not teach all who need to be taught the perfect art of butter-making, which is one of the useful arts that but few households possess. In the great butter market of New York, we find that not one tenth is really first-rate; and probably more than one half is sold from one to three cents a pound below the first price, while tons are sold every year at the price of soft grease, and used for other purposes than food. What a loss to the producers! In hopes to aid this class, we have embodied in this section directions for making butter, as practiced by some of the best butter-makers in the country. Among these we may name A. B. Dickenson, Hornby, Steuben Co., N. Y.; Jesse Carpenter, of Elmira, N. Y.; John T. Norton, of Farmington, Ct., and others.

498. **First Requisites in Butter-Making.**—A. B. Dickenson says: "One of the first requisites in butter-making is care that all the utensils of the dairy are kept dry and sweet; that the milk-room is well ventilated, of a proper temperature, free from dampness and the unpleasant smell generated by moisture; that the cream is not allowed to stand too long upon the milk, nor after it is skimmed; that it be churned at a proper temperature, the operation being neither hurried unduly or carried too far; that it should be salted with the nicest salt obtainable, not injured by the addition of sugar or saltpeter, and that all the buttermilk be properly and effectually removed.

"The utmost moisture which should be found in thoroughly worked butter is a very slight dew, and it should be of such firm consistency as to slice down, hardly dimming the brightness of a knife-blade. No butter is properly made unless it will bear these tests.

"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.

"No first quality of butter can be made either in November or August. While the one is too cold with frost-bitten grass, the other is quite too warm, and without ice it is impossible to make first quality of butter. Be careful in washing butter to handle it with a ladle, so as not to affect the grain; then put it away in some sweet, cool place out of the reach of any bad odor which it might absorb. When it has stood long enough to get its proper rich color, work it over and lay it down and keep it with the same degree of care. It would spoil in sixty days in a common farm cellar, where meats, fish, and vegetables are kept.

"It would be a much easier task to teach a man to make a watch than how to make the first quality of butter, as it is the most sensitive and the most liable to injury of all the eatables extracted from the vegetable kingdom. It is so sensitive as to partake of everything that can affect it that it comes in contact with—as onions, carrots, parsneps, turnips, fish, or anything else that would make it unpalatable, either in the butter or the milk before churning. Not only so, but the butter partakes of everything the cow eats or drinks, and the longer it stands after being made, the more perceptibly will the unpalatable things on which she fed make themselves manifest. By this it will be seen that the most important thing for first quality of butter is the food for the cow. Neither from roots of any sort or kind, nor grain of any description, can first quality of butter be extracted. It must be from something that imparts a sweeter and finer flavor. The cow must give good rich milk, as first quality of butter can not be made from poor pale milk, for it lacks the essential quality of good butter."

Rest and quiet are as important to a butter-producing cow as good food. She should never be dogged, beaten, driven on a run, nor have her quiet in any way disturbed.

499. **Churning, Washing, and Coloring Butter.**—In spite of all the patented improvements, the old dasher churn still holds its position, not only in families, but among dairymen. The following are A. B. Dickenson's directions for churning milk and working butter:

"The churn should be as nearly straight up and down as possible, as the dash should stir all the milk every stroke it makes, so that the butter in the churn should all come at the same time. If the milk is too cold, the only safe way to warm it is to place a pail of milk in a large boiler of warm water to bring it to the exact temperature, which is about 55 to 60 degrees—a few degrees warmer in cold than warm weather. As soon as the butter has come and gathered, take it immediately from the churn in its warm state and put it in a large wooden bowl, which is the best vessel for the purpose; then put it in cold, *soft* water; then commence pulling the butter over with the ladle in so gentle and careful a manner as not to affect the grain, for as sure as that is injured at the washing or working, the butter becomes oily and can never be reclaimed. Every particle of milk must be washed out, and then season with the best Liverpool salt. Set the bowl away until the next day, and when sufficiently cool, work the mass thoroughly, but not so as to make it oily, and on the third day pack it away if it has assumed the right color. Examine it well before packing, and be sure that no milky water runs from it, for if packed with the least drop, you will hear from it next April.

"If your spring or well is hard water, save ice from streams, as lime never congeals with ice. Save rain-water, and then with ice you will have soft, cool water to wash your butter, without which you can not get the milk out without injuring the grain. Soft water is as indispensable to wash butter as it is to wash fine linen. Washing butter is not positively necessary if it is to be used within a few weeks.

"The idea of coloring butter with anything after it is made is as absurd as painting rye bread white, with the expectation of making it taste like wheat."

Jesse Carpenter says: "The milk in the churn, when fit for churning, should indicate 64 degrees Fahrenheit, 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 degrees Fahrenheit, 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 done, carry the trays immediately to the cellar. Use one and a quarter ounces of salt to the pound of worked butter. Three or four hours after the first salting, stir with a ladle and put it in the form of a honeycomb, 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 wtih 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."

Mr. H. E. Lowman, a neighbor of Mr. Carpenter, states the following fact about his butter, which is a strong one in favor of washing butter:

"Mr. Carpenter for the last twenty years, besides fattening the calves to the customary age of four weeks, 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 then 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 exceeded the very highest market from ½ to 2½ cents per pound."

Butter is judged by its color, aroma, taste, and consistency. Its color should be a delicate pale straw, not approaching white, and yet perhaps that is better than the deep orange tint, almost always a sure indication of extraneous coloring matter. The peculiar smell of good butter is easily recognized. The better the quality the more delicate this aroma; while, as the quality degenerates, about in the same proportion does the smell vary, until it becomes positively offensive. This fragrance is dependent very much on the process of manufacture. Orange County dairymaids make "Orange County butter" wherever they follow the same processes. The taste of the butter will betray any inattention to the proper care of either the milk, cream, or the vessels in which they are kept. So will the addition of any foreign matter, such as impure or too much or too little salt, sugar, or coloring matter. A certain amount of salt is necessary to bring out the true flavor of butter in its greatest delicacy. In texture or consistency, a greater difference is seen than upon any other point. Some are firm, leaving no mark upon a knife after being thrust into a lump, with hardly enough moisture to dim its brightness, while other lots are soft, leaving greasy streaks upon the blade, and large drops of an opaque liquid oozing from the newly cut surface. The existence of either of these signs gives sure indication of an imperfect, if not bad, process of making.

500. **Number of Quarts of Milk for a Pound of Butter.**—The number of quarts of milk required to make a pound of butter varies very widely. By many trials in England, it is found that one pound of butter requires from fourteen to sixteen quarts of milk; that is about one ounce from a quart, varying with the feed and the season. Although it may be true that the milk of a majority of the cows in this country would require an equal number of quarts to make a pound of butter, yet there are cows that will give a pound to four quarts of milk. Col. Jaques, of Massachusetts, and Maj. John Jones, of Delaware, both had a "cream-pot" breed of cows which we saw a few years ago produce this result. But we believe that it requires an average of fourteen quarts to a pound, and that is why farmers prefer to sell their milk where it brings over two cents a quart. At that rate a milk-dairyman can not even afford to make his own family butter; he can buy it from a farmer, who can not sell his milk, at a rate more economical.

William Buckminster, of Framingham, Mass., in 1855, exhibited a Devon cow for premium, as the best butter-maker, with satisfactory proof of the following yield of milk:

"In June and July last she filled a common milk-pail, at night, as full as any dairymaid would wish to carry. And on June 17 her milk weighed, morning and night, each 34¼ pounds; June 10, morning and night, 34¾ pounds; June 19, morning and night, 34 pounds; June 20, morning and night, 32¾ pounds; June 21, morning and night, 32¾ pounds; June 22, morning and night, 30¼ pounds; June 23, morning and night, 30½ pounds."

He also certified at the time she was offered, in October, that four quarts of her milk, when fed on grass only, and that of an ordinary pasture, produced one pound of the finest yellow butter. "This cow," he says, "is one of the six cows owned and bred by me, whose milk has repeatedly yielded one pound of butter from four beer quarts. Her keep through the autumn of the three years of her milking has been grass feed only, no grain, or roots, or corn stover having been given her."

This is the richest milk of any but Alderneys, and above their average.

William S. Lincoln, of Worcester, Mass., produced from one cow, owned by him, in the spring of 1858, eighteen pounds of butter a week; and cows that produce fifteen or sixteen pounds a week are not uncommon in that State. The "Oaks cow" yielded her owner nineteen pounds a week at the best, and nearly 500 pounds in the course of the season. These are extraordinary cases, it is true; but if one cow can do it, others can.

Now, if these are facts—and who can dispute them?—what are we to think of the quality of judgment, sense, or economy of men who will keep cows on their farms for the sole purpose of making butter, at an average of one pound to fourteen quarts, when they could have cows that would give a pound from less than half that quantity? Let this fact be thought of, that it does take fourteen quarts of milk for a pound of butter, which might be made from four quarts. While this is a fact, it is not to be wondered at that Orange County farmers have quit making butter, notwithstanding the high reputation it had attained, and prefer to send their milk to New York from every farm within reach of the river or railroad. If the milk averages two and a half cents a quart when sold, and it would take fourteen quarts to make a pound of butter, it would make the first cost of the butter thirty-five cents a pound, besides all the labor of its manufacture.

The Homestead says: "Mr. Coit, of Norwich, keeps two cows which, in the best of the season, furnish four quarts of milk daily for use, and make nineteen pounds of butter a week. The writer also thinks that an improved style of milk-room would be quite as likely to increase the yield of butter as an improved breed of cows. If only an additional pound a week from each cow could be secured in this way, it would be a matter worth looking into by our farmers, and would greatly increase the yield of butter in the State."

Think of it, farmers, in every State. An additional pound of butter a week to each cow! What would be the aggregate? Can anybody tell? Can anybody think of the vast amount, and that it would be all clear profit? And it is just as easy as it is to do right instead of wrong.

Good cows, sweet feed, and pure water are the first of all requisites to the manufacture of good butter. Good cows, that proper color and right consistency be secured; sweet feed and pure water, that no flavor be imparted to the milk which would render the butter unpalatable. Dependent, however, as the quality of the article is upon the cow and the goodness of the food, a proper degree of care and skill on the part of the dairywoman is of much greater consequence.

Undoubtedly butter can be worked so as to keep sweet without washing; so can wheat be cut with a sickle, and thrashed with a flail, but they are not great labor-saving machines.

With successful butter-makers the churning occupies about half an hour. By increasing the temperature of the cream, it could be done in one half the time, but the quality of the butter would be much reduced. In winter, to facilitate the rising of the cream, the earthen pans for holding the milk are rinsed in hot water before use, and warm water is applied around them, not to heat the milk, but for a time to maintain its original temperature.

When the temperature of the dairy is less than fifty degrees Fahrenheit, the milk will not ripen for churning, and in such case should be removed for a time to a temperature of fifty-five degrees. The sudden warming of the milk will not always enable it to yield up its butter readily.

One butter-maker says: "Carefully conducted experiments prove that more butter is obtained from a given quantity of milk, when set in pans partly filled, than when full." This is in opposition to the theory of A. B. Dickenson.

A French chemist declares that butter may be made without churning, by the use of a filter, made of white felt, in the form of a bag, in the four corners of which are inserted porous strings, like candlewick, to hasten off the fluid portion of the milk. The bag being suspended by the four corners, from twenty-four to thirty hours, the contents of the filter will be found to be of the consistence of "smear case" (soft cheese). This solidified cream is then placed in a linen bag, tied tight, and the bag kneaded like a roll of dough. In a few minutes the mass grows liquid, and the butter and buttermilk are separated.

One large butter-maker says: "I use a horse-power churn, of a capacity sufficiently great to make one hundred and twenty pounds of butter. I always try the temperature of my churn before putting in the cream. If below fifty-five degrees, I raise it to that point with warm water, and keep the cream as near that point as possible. As soon as the cream is in the churn I start the horse, and keep him moving at a steady gait until the butter is broken, or begins to gather in small lumps. Opposite the opening through which the cream is poured into the churn is an inch hole, which is stopped with a plug. When the butter is formed as above stated, I open this hole and draw off all the buttermilk, then start the horse again, and keep him going until I gather the butter into a solid mass. This accomplished, it is taken from the churn and put into a tub prepared for it. I then weigh the whole mass, and transfer it to the butter-worker, when it is worked over twice, after which I add one dessert tablespoonful of the very best dairy salt to every pound. I again work it well, so as to incorporate the salt thoroughly. It is again weighed into pound lumps and printed. The human hand is never allowed to touch the butter, nor is water ever used to wash it."

Of course it is sold immediately; if it is to be kept, we think it must be washed.

501. **Butter Affected by Food of Cows.**—The quality of all butter is so greatly affected by the food of the cows, that no one can make good butter, although he has good cows, if their food is poor. In summer, there is nothing better than clover pasture. At any rate, the pasture must afford sweet grass, running water, and trees for shade and rest. A cow should be selected for her quiet disposition, as much as any other quality, for a butter-making cow; for milk alone, this is not so important. If she has vicious propensities, she can not be cured by viciousness. In winter, clover hay, cured in the most perfect manner, is better for butter than any other hay. To this add slops once or twice every day, composed of bran, shorts, cut potatoes, corn meal partially cooked, and salt, and an occasional handful of bone meal, lime, ashes, or charcoal-dust will be found advantageous. Carrots are always good for a butter cow. Nothing should ever be given her that is not sweet enough for you to eat yourself. And even that is not always good food for a cow, as turnips, cabbages, and onions are considered good food for the table—they are not for the stable, if sweet milk is an object.

Then she must be kept in a clean, sweet-smelling stable, warm and dry, but ventilated. The same stable should be used in summer for milking, after which the cows may be allowed to sleep out, if it is such weather that they can lie upon the ground in comfort; and if not, keep them in until after milking in the morning. Every cow should know her own stall as well as a man knows his own bed, and they will soon learn to be unwilling to eat or be milked anywhere else. Food and care of the cow, and perfect quiet and comfort for her in every respect, are the first requisites in making good butter.

A stable can be kept sweet enough to lodge in by the daily use of plaster, charcoal, prepared muck, or an occasional sprinkling of dilute sulphuric acid or solution of copperas.

It is necessary for a full flow of milk to maintain a continual supply of albuminous food, while in the latter period of fattening, such kinds of food are superfluous, and only tend to enrich the manure heap There is one leading feature in his practice, to which the utmost importance is attached by Mr. Horsefall—an English dairyman—the maintenance of the condition of his cows giving a large yield of milk. This is done by the addition of bean meal in greater quantity to those yielding the most milk He refers also to the effect of clover upon the supply of milk as known to all dairymen, the dry material of which is nearly as rich in albumen as beans, and the inference is drawn that "albuminous matter is the most essential element in the food of the milch cow, and that any deficiency in the supply of this will be attended with loss of condition, and a consequent diminution in the quality of her milk." He is of the opinion that "you can increase the proportion of butter in milk more than that of casein or other solid parts." Rape-cake seems more efficient for this purpose than linseed-cake, the oily matter in this seed more nearly resembling that in butter than that of flax-seed. He also says: "It seems worthy of remark that a cow can yield a far greater weight of butter than she can store up in solid fat. Numerous instances occur where a cow gives off two pounds of butter per day—fourteen pounds per week—while half that quantity probably would not be laid on in fat if she was fed for that purpose."

These "English notions" are worthy of American attention.

502. **Butter Affected by the Packages.**—It is one of the greatest mistakes that butter packers make, to put it up in bad packages. Let it be taken for an incontrovertible fact that, as a general thing, a dairy of butter of uniform quality may be packed, one half in rough, untidy casks, and the other in neat, sweet-looking firkins, of suitable and uniform size, and that half will outsell the other at least ten per cent. The purchasers of butter, by the single package or by the hundred packages, are always influenced by the outside appearance. One of the reasons why Western butter sells at a price generally under the market is because it comes in bad order. How can people expect first prices for butter in mottled rolls, packed in a dry-goods box or a flour barrel? Such butter, when it arrives in New York, is denominated "Western grease," and sells at a price corresponding with its name.

503. **When to Skim Milk.**—The right time to skim milk is just as the milk begins to sour in the bottom of the pans. Then the cream is all at the surface, and should at once be removed, with as little of the milk as possible. That housewife, or dairymaid, who thinks to obtain a greater quantity by allowing the milk to stand beyond that time, labors under a mistake. Any one who doubts can try it. Milk should be looked to at least three times a day.

504. **Alderney Cows and Alderney Butter.**—It is our matured opinion that the Alderney cow is the only one for a family, where but one is kept, and where rich milk and sweet cream are a leading object. (See 47, 48, 49.) There is no doubt of the fact, that this breed of cattle is superior to any other for making butter of rich flavor to the taste, and with a peculiar sweet aroma. We have thoroughly tested butter made from Alderney cows, by John T. Norton, of Farmington, Conn., and have submitted it to the sight, smell, and taste of some good judges of butter, who, without hesitation, pronounced it as unlike as it is richer than any other kind they have ever tasted. We kept it some weeks exposed to an atmosphere that would soften ordinary butter so that it could not easily be handled, and yet this remained almost as firm as though just from a cool dairy-room. There can be no mistake in its natural superiority and good keeping qualities over butter made from cows of other breeds. This fact is as well known in England as the fact that Southdown mutton is superior to that of other breeds of sheep. And the fact is beginning to be known here, for we have heard of Alderney butter selling in market, in places where it is well known in this country, at double the price of good butter of common stock. This much for the in-

formation and benefit of those who do not know that there is a very great difference in breeds of cattle for butter as well as for beef. For the latter purposes the Alderneys are certainly superior to the Durhams. Herefords, Devons, Ayrshires, or natives.

Another good quality of the Alderneys is, that they will live upon house-slops or garden or yard clippings, or upon short pastures.

Mr. Norton says: "I live on one of the old worn-out farms of Connecticut, which I am trying to improve;" and we say, upon such a farm he finds it not only pleasant for his own use to keep Alderney cows, but profitable to make butter from them for the Hartford market. Our recommendation, however, is not for dairy purposes, but strictly for private family use, and for that we do consider this small breed of cows most valuable. There are persons, however, of experience, who believe the Alderneys valuable for dairy farms.

T. M. Stoughton, of Greenfield, Mass., says: "Alderney cows are not only good for private family use, but actually the best for a large dairy.

"My experience has been with a herd of cows imported by Mr. Jonathan Bird, of Belleville, N. J., from the island of Jersey, and selected with particular regard to their milking qualities. The herd came under my care in 1856, with the request from Mr. Bird that I should give them the same care and feed as my native and Ayrshire cows, keeping a careful account of their product by measurement and weight, so as to be able to determine whether they are a profitable breed for butter-making. The following statement is offered as an answer to 'What is a good cow?'

"Cow No. 1 calved in January, 1851—came into my care last of May. In June, she made $10\frac{1}{2}$ pounds of butter per week; in July, $10\frac{1}{4}$ pounds per week; in August, $9\frac{1}{2}$ pounds per week; in the month of September, 30 pounds; in October, 28 pounds; and two weeks in November, $12\frac{1}{4}$ pounds; and calved in December—making $198\frac{1}{4}$ pounds in five months.

"No. 2 calved in September, 1851, and through the month of October made $14\frac{1}{2}$ pounds of butter per week; in June following she made 12 pounds per week; in August, 6 pounds per week; and calved early in October—making 317 pounds of butter for the year.

"No. 3 was a three-year-old heifer, calved in September, 1856. In the month of October, made $11\frac{1}{4}$ pounds per week; in June following, $8\frac{1}{2}$ pounds per week; in August, 4 pounds per week—making 267 pounds for the year.

"No. 4 was a heifer two years old; calved in March, 1858. From the 1st of April to November she made 200 pounds of butter. Greatest yield per week, $10\frac{1}{4}$ pounds; and made 7 pounds per week in September.

"No. 5, a heifer eighteen months old; calved in March, 1858. In the five months following she made 108 pounds of butter.

"The above five are an average of the ten milking cows. Their feed has been pasture only in the summer months, with hay and two quarts of corn meal and rye middlings in the winter months. From the above statement it will be seen that the cows which have come to maturity will make 300 pounds of butter per year under favorable circumstances. Alderney butter sells in the different markets of the country for from forty to fifty cents per pound. The best dairies of New York and New England do not average over 200 pounds per cow (native and Durham). The average price of their butter is not over twenty-five cents per pound.

"One of the most important peculiarities of the Alderney cow is her uniformity of quantity, making nearly as much butter at the end of eight months after calving as at four. The objections urged against the Alderney cow are, that she is a voracious feeder, lean, awkward in appearance, and will make but little beef when old.

"Admitting the Alderney cow to be a pretty sharp feeder, it can hardly be expected that a cow will make from ten to fourteen pounds of first-rate butter by simply standing in a cold stable, and looking at a haymow, or by shirking round a stack of swamp hay. That she is inclined to be lean is an evidence that she is a good milker; for a cow that secretes fatty matter can not secrete good milk at the same time, without being fed too high for the permanent good of the cow. If she is ugly to look at she is a good one to go, for she will be worth $100 when six months, especially if a heifer. And after being milked twelve or thirteen years, producing over 3,000 pounds of butter, it is of no great consequence whether she makes 600 or 900 pounds of beef."

505. **Heating New Milk.**—The *Dairyman's Record* gives the opinion that the heating of new milk to near the boiling-point just after it is drawn from the cow, is preferable to allowing it to stand for a time before heating, and thinks both butter and cheese are improved in flavor by so doing, "because the animal odors which are objectionable would be expelled," and goes on to say that "tasteless and leathery" cheese is caused by manufacturing under too high a temperature rather than from high heating before manufacturing.

506. **Dust and Fly Covers for Milk-Pans.**—To keep dust out of milk-pans, make hoops of ratans, or ash wood, a little larger than the tops of the pans, and stretch over and sew on them some thin cotton stuff that will not stop the circulation of the air, but will keep out the flies and mites, and when the milk is cool, lay these covers over the pans. To keep out flies, use mosquito netting or wire gauze instead of cloth. The wire gauze is a fine thing to cover all windows in fly-time.

Some inventive Connecticut genius has contrived a portable, ventilated milk-closet, which, from the description, we should think a very good thing, but presume that any ingenious wood-worker could get up one a little different in form to answer the same purpose; and we recommend all families who keep but one cow, to provide themselves with such a convenient ventilated milk-closet; or one that will let fresh air in and foul air out, and keep the milk safe from pestiferous insects and vermin.

The following item shows the benefit of keeping milk cool: "In sending milk to market, though it left the dairy perfectly sweet, it was often found curdled on delivery to customers. To remedy this, the cans were covered with thick cotton cloth, and this was wet with salt water. In this way the difficulty was entirely obviated."

507. **Necessity and Value of a Family Dairy Room.**—Every farm-house should have a room for milk, solely devoted to that, and nothing else. In very dry soils this can be made easiest and best in the cellar, provided it has a chimney ventilator of ample dimensions running to the top of the house, which can be easily made when building, and no milk-room is perfect without such ventilation, and in our opinion the cause of bad butter is as much in the want of a suitable place to stand the milk, and a cool, sweet room to store the butter, as in the process of manufacture. It is all important, also, that the milk-room should be of an unvarying temperature, so far as it can be kept so without extra expenditure over the profitable advantage. An attachment to the ice-house is the best place for storing butter. The following is a good plan for a family dairy-room:

Build very convenient to the kitchen, but not adjoining, an eight-inch wall brick building, eight feet by sixteen feet inside, with a door in one end and a window in the other, and arch it over ten feet high in the center, and plaster it all over outside with water-proof cement. The top should be covered with a coat of asphaltum, if to be had, or else with sand and tar. Give the inside a coat of hard-finished plaster, and paint that well, so that it can be washed. Where there is a good chance for drainage, the walls may be dropped two feet below the surface, or the whole built into a hillside, in which case there can be no door nor window in one end, but there can and must be a large chimney ventilator. Make the floor of cement or flagging-stones, and, if not too expensive, use stone shelves, built in the wall. The outside is to be banked up with earth and sodded over so as to form a grassy mound, forming, in fact, a sort of cave cellar. A retaining wall must be built each side of the door-way, and a shed over it, with wire-screened windows in the door for ventilation, the sash being hinged to swing down and fasten to the lower half of the door. Such a room will keep milk sweet and of even temperature, and is not more expensive than a good frame building.

The place where the milk is set, churning done, or butter stored, should be absolutely sweet, clean, and deodorized of every smell. Water—cold water, and its liberal application—is an essential about the dairy-house, and outside of it; upon everything ever used, hot water, soap and sand, and hard hand-work, to make absolute purity, are the essential requisites to produce good butter. Every woman should assure all the "men-folks," and often repeat it to them, that no woman can make good butter if the cows are not provided with suitable food. Recollect, food and shelter—airy, roomy, clean stables, summer and winter; none of your milking in the road, among the hogs; setting milk for cream where the air is scented with hog-pen effluvia, or any other but that of roses, mint, and new-mown hay.

Food is the first, purity the second, temperature the third requisite in making sweet yellow butter.

The best way to make dairy shelves is to use strips sawed one by two inches, and set so that the pans will stand upon their edges, or else place them wide enough apart to receive the bottom of the pan, having cross strips nailed in to support the sides, so that the pans would only touch at four points, and so cause the milk to cool quickly, and save labor in keeping the shelves clean; for a pan of warm milk set upon a flat shelf in a room a little damp, or when the shelf has just been washed, will generate mold—certainly more than when set on strips, as here recommended.

A Mr. Motley, of Massachusetts, has a dairy-room in the cellar of his house, and arranged to be ventilated by an area window, which is covered with wire netting. The floor is cemented, and of course kept scrupulously clean. Plain, broad wooden shelves around the four sides of the room hold the pans of milk. A marble-top table, standing in the center of the apartment, is used for working the butter, and preparing it for market. The milk is churned in one of the well-known Crowell "thermometer churns," of a capacity of thirty gallons. A small air-tight wood stove is used to insure an equable temperature in winter. About 100 pounds of butter are made weekly, which is sold to gentlemen in Boston at fifty cents per pound. It is put up in neat quarter-pound rolls, prettily stamped, and sent to town in tin boxes, fitted with shelves inside to keep the layers of rolls separate. As to the delicious quality of the butter, that is proved by the price.

508. **How to Make Winter Butter.**—If cows are fed with roots, meal, or even whole corn, which, by-the-by, is only to be tolerated when corn is worth less than twenty-five cents a bushel, there will be no complaint of poor white butter, unless the fault is in the churning or the keeping of the milk. Milk, in winter, should be kept about the same temperature as in summer-time, and should not be allowed to stand unskimmed merely because "it is taking no harm." Take off the cream, and if not enough for an immediate churning, let it be kept cool and sweet till enough is accumulated, when, if it is necessary to sour it, it may be put in a warm place and done all at once. When put into the churn, it should be at a temperature of 62 degrees, and if kept at that, yellow butter will be got in thirty minutes by churning moderately, if your cows have had a little salt every day.

509. **Butter Colored to Order.**—Are the butter-eaters of New York aware that butter, so far as color is concerned, is made to order as much as their boots, hats, and coats? We assure them that such is the fact, as is well known to all dealers, and should be known to all consumers, and by them wholly discountenanced. Our present notice of the fact arises from hearing a woman bitterly denouncing the grocer who sent her "white butter." After she had selected some "nice yellow" butter, at two cents higher price per pound, and retired, the grocer asked us to test the samples. We found the rejected white butter as sweet and fresh as could be desired, and worth twenty per cent. more than the other, according to our taste. The other,

however, was pretty to look at. It was of a deep yellow hue, but we at once declared that it was made so by annatto. "Yes," said the grocer, "you are right. That butter was made to order for me for just such customers as that woman, who do not know good butter by the taste—they judge only by looks. It actually cost me two cents a pound less than the other. You saw how I sold it."

A butter-maker, writing to the author about "coloring butter to order," says:

"We think you New Yorkers possessed of remarkable tastes, if you really prefer butter made yellow to order instead of that of a natural color, though perfectly sweet. If it is the color instead of the quality that you care for, we shall have to solicit a sample of the shade desired, and order more dye-stuff. We shall have to make butter for home use and for city use, as no one in the country will eat colored butter in winter except as the milk colors it. There is but very little in the country at this season that answers the orders from the city, except such as has been fixed up to suit your market."

Now, butter-eaters, you hear how yellow butter is made "fresh from the cow" in winter, and how much you pay for the privilege of eating "annatto and other dyestuffs."

510. **Rules for Salting Butter.**—First, none but the very purest rock-salt, or manufactured salt, prepared especially for the dairy, should ever be used. An experienced Scotch dairyman says:

"Take the best crystal salt, wash it, dissolve, strain, settle, and turn off; boil it down in some perfectly clean iron vessel, skim as boiling; when stirred off dry, it will produce fine salt, white as the drifting snow, which, if stirred up in a glass of water, will produce no sediment, and will be distinct from any mineral or other possible impurity."

Three experienced dairywomen in Berkshire County, Mass., give the following rules for quantity:

"No. 1. A teacupful of salt to six pounds of butter.

"No. 2. One pint of salt to fifteen pounds of butter.

"No. 3. An ounce of salt to a pound of butter."

Salting the cream before churning has been advocated as a good practice. To every quart of cream, as it is skimmed and put in the pot to accumulate until sufficient for churning, add a tablespoonful of salt. It is stated that the time of churning is very much lessened by salting the cream.

511. **Packing and Preserving Butter.**—A patent has been granted to W. Clark, of London, England, for a new method of treating butter. The butter is worked in the usual manner, and is then placed between linen cloths and submitted to severe pressure, which removes the whey and water. It is then covered with clean white paper, which has received a coating on both sides with a preparation composed of the white of eggs and fifteen grains of salt to each egg. The paper is dried, and then heated before the

fire or with a hot iron just before it is applied to the lumps of butter. It is claimed that butter treated in this way will keep two months without salt in a cool cellar. Any ordinary cheese-press, or the presses accompanying the portable cider-mills, now common, will answer the purpose. Pressing removes the water, and the prepared paper excludes the air.

Earthen jars, made of the size and shape of a fifty-pounds tub (not a firkin), and put in a wooden tub, made to fit, with a head in each end, are recommended as an improvement for packing butter. If desirable, the wooden tub may be made large enough to fill with salt between the two, or can be made close. The heads should be made close to the butter-pot in either case. Butter packed in this way will keep sweet any length of time, if well made, while in the present mode of packing, in nine cases out of ten, it will taste of the tub after being packed two months. The first cost of the two is about one dollar, and after being sent to market, they can be returned a distance of 300 miles at a cost of about thirty cents. We fear the expense of this improvement will prevent its general adoption, though we can perceive no reason to doubt its efficacy.

There is no doubt that if butter could be rendered absolutely pure, it would keep, if excluded from the air, as well as sweet-oil. That it is hardly ever pure may be shown by a sample melted, and put in a bottle, to stand a few hours in a warm place, when the oily part will float upon the top of water or other impurities it may contain.

512. **How to Cool Butter without Ice.**—The following plan of cooling butter is founded upon the scientific principle of cooling a body by evaporation. Fill a deep plate or flat dish with water, and in that set a trivet, such as are often used upon the ironing-table, to hold a plate of butter above the water. Cover the butter-plate with a porous, earthen flower-pot that must have its edge immersed in water, and a cork in the hole in the bottom. Now dash water upon the pot, and repeat several times as it evaporates during the day, keeping it in a cool place, and at supper-time you may bring your butter to the table as delightfully firm as you would from an ice-house.

513. **Milking by Machinery.**—If anything has been or may be invented to relieve woman from the tiresome labor of milking, it will be hailed with intense satisfaction. We therefore chronicle the fact of the recent invention of a milking machine. The manner of its construction is simple enough. It consists of two diaphragm pumps made of tin and India rubber, so arranged as to be easily taken apart for washing. The teat-cups are made tapering to fit any size, and attached by flexible joints, so as to be spread apart to suit wide-spreading teats, or those more contracted. It is possible that it will prove a very useful invention. If so, we presume that farmers will hear more of it.

The machine is attached to a pail, and set on a stool under the udder, the four teats inserted in four tubes, and the pump operated, and the milk drawn and conveyed by a conductor into the pail, the inventor says in a marvelously short time—say three minutes for an ordinary cow; milking entirely clean, without injury and to her advantage, as it is beneficial to have the work done quickly, and the machine is intended to do it quicker than it is possible by hand. It is said also that cows gently stand this machine milking; the contrivance is ingenious. and will work. Its practical utility we can not vouch for.

514. **How to Make Cows give Down.**—We have often heard that one man could lead a horse to water, but two could not make him drink. The great mistake of most people in the management of horses, cows, and even men, is trying to make them do things by force instead of milder means. The best way to make a cow give down is to coax her. Patience and perseverance will generally overcome the difficulty and effect a cure. We have seen cows that had been trained to being fed when milked until they would only give down when bribed to do so. Strapping up the fore leg of a cow with a strap slipped over the bent knee so that she can not walk until milked, will sometimes cure her refractory disposition. If a cow will not give down by gentle means, it is of no use to try to make her do it.

515. **Milk Farms—Product, Price, Profit.—Milk for Cities—Condensed Milk.**—The entire business of many farmers, near cities, is producing milk for sale. It is sent by railway more than 100 miles. The average value upon the roads that supply New York may be three cents a quart, ranging about as follows, as a general thing: for five months, at 2 cents; one month, 2½ cents; two months, 3 cents; four months, 3½ cents. Freight will average two cents a quart, besides a great loss of cans. It costs the farmer most to produce milk in April. The cost of winter feed, 5 lbs. of meal and 15 lbs. of hay per day. The annual average product of good cows would be $60 each. If cream only is sold, say 10 quarts per week at 15 cents, and 9 lbs. of "skim cheese" at 8 cents, will make a cow yield $2 22 per week.

The yield of milk of extraordinary cows has been, for one, 15½ quarts a day for 150 days; for another, 14½ quarts a day for six months, sold at 3½ cents a quart, producing $107, from one cow, fed on grass and meal.

The income of an Illinois cheese and butter dairy, owned by Mr. Savory, of De Kalb County, is given as follows, in a poor, dry season: 10,500 pounds of cheese, at 10 cents, $1,050; 500 pounds of butter, at 14 cents, $70; 50 calves, at $1 50, $75; whey and sour milk (estimated), $50; total income, $1,245. DR.: 50 cows—to getting 100 tuns of hay, $150; care, milking, etc., $200; two hired girls, 30 weeks, and board, $180; interest on cash value of cows, $100. Total cost, $630—$24 per cow; and taking value of feed and labor into account, was perhaps as profitable as a New York milk farm. See ¶ 41, etc.

CONDENSED MILK.—There is one method of sending milk to the cities, lately adopted, that will enable farmers living beyond the limit of shipping fresh milk, to send it to market. It can be done upon the same principle as associated cheese dairies. See ¶ 518. There are two modes: the product of one, called "condensed milk," resembles rich, thick cream; the other, called "concentrated milk," resembles and is composed in part of dry, white sugar. The former has nothing added, but much taken away.

The process of condensing milk was invented by Gail Borden, Jun. (himself an octogenarian). The first manufactory was established at Burrville, Litchfield Co., Conn., if we remember rightly, about 1854–55, and is still in successful operation, conducted by Wm. Borden. Another establishment has since been started at Wassaic, Dutchess Co., N. Y., on the Harlem Railroad, 85 miles north of New York. This is conducted by the inventor himself, whose residence is at that place, where parties desirous to commence similar operations can obtain the necessary information. The product of this invention furnishes to residents in cities who have a taste for pure milk all that they can reasonably desire. The process of condensation not only separates the water from the more solid elements of the milk, but absolutely frees it from all impurities, even including the unpleasant odor that is usually combined with the milk of cows, and which sometimes, when they are unhealthy, is exceedingly offensive. Samples of milk from all the dairies are constantly subjected to tests to indicate the quality and detect impurity. As it is brought in from the farms, it is emptied through fine strainers into tin cooling vats. These must be placed in running water or cooled with ice. The first process in the operation of condensing milk is to free the natural milk of all its animal heat; and during this cooling, if there is any sediment that was not removed by the strainers, it is found in the bottom of the vats and rejected. The milk is then heated by steam nearly up to the boiling-point. This brings up a very small per-centage of cream that makes butter. The milk is now ready to commence the process of condensation, and is drawn by an exhaust-pipe into a steam-boiler heated by coils of pipe which raise the temperature to a given degree, converting the water into vapor which fills the upper part of the boiler from which it is pumped off; and as it is discharged into the air, it gives out a fetid odor almost equal to the swill-milk of New York. This pumping is continued until this odor is exhausted, and until so much of the water has been separated from the milk, that when it is once cooled again it has the appearance of thick, smooth cream. It is then packed in cans for transportation; and we see no reason why milk could not be put up in this way upon the prairies of Illinois as well as the pastures of Dutchess County.

For many purposes the condensed milk is used in the same condition; for ice-creams, eating upon fruit, and many culinary purposes, it is delicious.

When milk is desired in its ordinary condition, add water until the condensed milk is thoroughly combined with it, and it is like good, rich, fresh milk, except that it has lost a little of that piquancy which is found in some "pure milk." and which some city people seem to relish.

The advantages to the farmer of this invention he will readily understand. A milk-condensing factory established in any neighborhood, as it may be wherever there is a pure stream of water, would prove as great a convenience as a grist-mill, and more advantageous, because he can sell his grain in the rough state, but can not dispose of his milk unless it is converted into some condensed product. The advantage of selling milk instead of converting it into butter or cheese, every farmer can calculate for himself, upon the basis that it will require four quarts of milk for one pound of cheese, or fourteen quarts for one pound of butter, taking the average product of cows and average process of manufacture. If intended for a condensing factory in the immediate neighborhood, the farmer would be enabled to carry the milk directly from the stable.

Another advantage would be gained in the saving of cans, many of which sent to cities are lost in spite of all the care of the owners. The establishment of such factories will open up new fields of industry in many parts of the country, adding wealth, comfort, and happiness to farmers' families. We urge them all to consider the subject, and compare with other products of the dairy this new one of condensed milk.

516. **Cheese—How to Make It.**—The following directions are given by Edwin Pitcher, of Martinsburg, N. Y., a noted maker of good cheese:

"The way to make a mild, rich, good-flavored, sound cheese is to work the curd carefully, so as not to start the white whey, or, in other words, work out the cream; second, cook it well; salt even, and enough to make it good flavored; press it well, and keep it cool and dry when made. A neglect in part will spoil the whole. We set our milk 86 degrees, as nearly as we can, and put in rennet enough to bring the curd in half an hour.

"We use a cheese-cutter. Cut the curd carefully over once, and then let it stand fifteen or twenty minutes, till the whey begins to rise; then work it fine with a cheese-cutter; then put hot water enough under the tin vat to raise the heat to 90 degrees. Stir often, so as not to let it pack down. We then dip off about one third of the whey, and increase the heat to about 102 degrees, and keep it at that heat till it is well cooked, keeping it fine all the time. When it is done, it will fall apart in the hand like wheat. We dip out of the tin vat (when it is cooled down to 90 degrees) into a sink, and when the curd is dry put in a teacupful of salt curd, enough to make fifteen pounds after it is pressed. If the curd is a little too soft, put in a little more salt to harden it. We cool in the vat, in hot weather, by putting in cold water under the vat, to 90 degrees, before dipping out. I think it hurts the cheese very much to dip it out too hot.

"My cheese-room is plastered, and I let down my windows from the top in hot weather, and I have a ventilator in the center overhead. The floor is matched and made tight, so as to shut up the room in cool weather, with seven trap-doors to let in the air when necessary. I think it essential, in making good cheeses, to keep them cool. The cheese-room should never be over 75 or 80 degrees, and it is better not over 70 degrees. I use cold water on the floor, and a large piece of ice in a pan on the counter if the weather is too hot. Keeping cool is a great cure for almost everything. It saves cheese from fermenting and becoming strong. You can not very well cook your cheese too much in May or June, and you must be sure and keep your rennet sweet."

A first-rate cheese-maker of Herkimer County, N. Y., gives the following as her practice:

"I set the milk at 90 degrees, in spring and fall, and 86 degrees in hot weather. Heat up three times—first 90 degrees, then 95 degrees, and last 100 degrees. I put about one teacupful of salt to sixteen pounds of curd, and use much care in breaking it up and working; cutting at first with a dairy-knife of four blades, and using the knife with one hand during the whole operation, taking particular care not to squeeze the curd in any way, but pass one hand under, and lifting gently, and letting it fall off the hand and between the fingers, and with the other keep the knife in motion in the curd, cutting it as fine as possible by the time it is ready for salting.

"Thought and care are essential in all the various operations. Intense interest and anxiety are necessary in order to do all these things well, for they influence the texture, flavor, and quality of the cheese.

"Rennet.—The stomach of the calf should be taken when empty (no curd in it)—care taken not to get dirt on it—and, without rinsing or washing, salted inside and out with one teacupful of salt to a rennet, and placed in an earthen dish. It should lie in the salt two days, then be stretched and dried upon a stick in the form of a hoop. When dried, take it off the stick, and place it in a tight sack for use. Those prepared one season are not to be used till the next.

"When rennets are to be used, put three in an earthen vessel; then take two gallons of water, put one quart of salt in it, boil and skim, and cool till milk-warm. Then pour it upon them, and in one week the liquor will be fit for use. One teacupful of it will curdle the milk of two milkings from fifteen cows, fit to break up in forty minutes."

An experienced cheese-maker of Warner, N. H., gives her method as follows:

"I first scald the tub, then strain the milk into it as soon as brought from milking. Next put in sufficient rennet, the quantity depending upon the quality to fetch the milk to a curd in from forty to sixty minutes. The curd is then dipped carefully into the basket for draining until the next morning. The morning's milk is prepared in the same manner (after the thorough scalding of the tub). The curd, when formed, is dipped in with that of the previous evening; then left to drain, with an occasional stirring with a knife or slice. I prefer a knife, as it is not so likely to injure the curd. When sufficiently drained, which it will be by nine or ten o'clock if properly attended to, I tie together the ends of the cloth, and hang in the cellar until the succeeding day, when the curd of that day is prepared in the manner of the previous day's curd. It is now ready for scalding. I pour boiling hot water, at the rate of one gallon for ten pounds of curd, into the tub; next slice in the curd from the basket, handling it carefully, so as not to disturb the white whey. The curd is next brought from the cellar and sliced in the same manner. It is put in lastly, for being older it does not require as much scalding as the newer curd. I now let it stand from five to ten minutes, from the time the last slice is dropped in, then dip back into the basket, curd and water together, to drain. I check and stir it up with the knife four or five times, when it is ready for grinding. The mill is placed upon the cheese tongs over the tub; the curd is then sliced into the mill and ground, when it is ready for the seasoning, which consists of a common-sized teacupful of rock-salt and one teaspoonful of saltpeter for every twenty pounds of curd. It is thoroughly mixed—not squeezed—with the hands. It is then ready for pressing, which is done gently until night, when the cheese is turned, cloth changed, and put back to pressing with sufficient weight, where it remains until the next cheese is ready for the press."

We find in the best large cheese-dairies of this country, that where the curd is scalded by steam, that the right temperature varies among different cheese manufacturers; thus Mr. O. S. Cumings, of Trenton Falls, N. Y., scalds to 104 degrees; Mr. A. Coon, of Russia, from 108 to 110 degrees; Mr W. Buck, 102 to 104 degrees; and Mr. S. N. Andrews, 100 to 102 degrees.

517. **English Cheese-Making.**—The method of heating the milk by the application of steam to the cheese-vat, is a great improvement over the English method. So is the method of separating the curd from the whey by straining it through a cloth much more expeditious. In Cheshire the whey is removed by pressing down a flat-bottomed pan gently on the curd in the cheese-tub and allowing it to fill. When the curd is thus partially freed from the whey, it is again gently broken and allowed to settle and separate and the whey is boiled out slowly, the curd being placed on one side of the tub, which is slightly raised, and a board is placed on the curd with heavy weights on top to press out the whey.

The curd is then cut into pieces six or eight inches square, and again pressed with heavier weights. When as much whey as possible is removed in this way, the curd is placed in a vat and gently broken. It is then put under the press and a slight pressure applied at first, which is gradually increased till no more whey can be pressed out. To facilitate the flow of the whey, the cheese is pierced with skewers. This preliminary pressing occupies four or five hours. The cheese is then taken out of the press, broken up again very fine, salted, put up in the vat again, and pressed under a heavy press for three or four days, clean and dry cloths being put round the cheese as the old ones become wet.

This is a tedious process, and we think some of the operations of the American process might be adopted in England with advantage. The essential point of difference is the scalding; this renders less salt and less pressing necessary. There can be no doubt that the preserving action of the salt is greater in proportion to the absence of whey in the cheese when it is applied; and it is for this reason that the Cheshire dairymen press their curd before the salt is added. Many people prefer cheese made by the English process.

518. **Cheese-Making by Associated Interest in Manufactories.**—This system was originated, we believe, by Jesse Williams, of Rome, Oneida, Co., N. Y.,

somewhere about the year 1850. Since that time it has been greatly extended in Central and Northern New York, and considerably in Northern Ohio. It is like the manufacturing of any other farm produce, except that this is usually carried on upon joint account of the producers of the raw material. The success of this mode of cheese-making has now become fully established. It not only lessens the expense of manufacture, but improves the quality of the cheese. The establishments vary greatly in size, using the milk of from one hundred to fourteen hundred cows. The business has become so important that regular organizations have been effected, both in New York and Ohio. To enable our readers to consult with those already engaged in the business we give the following list, naming the owner or superintendent and location of a number of establishments represented in a convention held at Rome in January, 1864. This list, though representing only a portion of the dairy interest, shows how the subject has affected the minds of farmers in the central part of New York.

Names.	Factories located.	Cows.	Names.	Factories located.	Cows.
Hugh Quinn	Oneida Co.	527	L. M. Dunton	Lewis Co.	800
Williams, Adams & Dewey	Oneida Co.	350	Asel Burnham, Jr.	Chautauque Co.	500
G. W. Davis	Oneida Co.	380	Hanck, Wilcox & Co.	Chautauque Co.	600
F. Clark	Oneida Co.	350	Clear Spring Factory	Chautauque Co.	600
Hiram Brown	Chenango Co.	500	A. L. Fish	Herkimer Co.	500
James Rathburn	Oneida Co.	707	Sehnser & Davis	Fulton Co.	600
Charles Rathburn	Oneida Co.	125	Caydatta Cheese Factory	Montgomery Co.	600
J. W. Brooks	Oneida Co.	320	West Eaton Factory	Madison Co.	600
G. E. Morse	Madison Co.	650	Miller, Fowler & Co.	Oneida Co.	800
J. Greenfield	Oneida Co.	300	R. U. Sherman	Oneida Co.	130
D. Ellis	Warren, Mass.	500	Jerome Bush	Lewis Co.	700
Isaac Shell	Herkimer Co.	600	A. S. King	Oneida Co.	200
A. Anstead	Oneida Co.	500	S. Allen	Oneida Co.	500
J. G. Coates	Oneida Co.	300	Alfred Buck	Oneida Co.	475
Henry Hill	Oneida Co.	500	Brown & Co	Madison Co.	800
G. W. Wheeler	Oneida Co.	200	F. A. Norton	Madison Co.	500
Gold Creek Factory	Herkimer Co.	600	S. Conan	Madison Co.	600
Collins' Factory	Erie Co.	1,000	Savery & Coventry	Madison Co.	600
New Woodstock Factory	Madison Co.	1,200	Kirkland Cheese Co.	Oneida Co	800
F. Smith	Oneida Co.	575	J. L. Dean	Oneida Co.	300
Crosby & Huntington	Oneida Co.	510	Colosse Cheese Factory	Oswego Co	500
G. B. Weeks	Oneida Co.	640	Harvey Farrington	Herkimer Co	470
H. L. Rese	Oneida Co.	1,000	J. H. Hubbard	Oneida Co.	400
B. F. Stevens	Lewis Co.	800	David Yourden	Oneida Co.	150
T. Tillinghast	Cortland Co.	900	Ezra Barnard	Oneida Co.	220
Kenny & Frazer	Cortland Co.	1,400	Asa Chandler	Oneida Co.	270
Rome Cheese Manuf. Ass	Oneida Co.	624	J. M. Farnham	Lewis Co	897
Wright & Williams	Oneida Co.	550	David W. Wilcox	Oneida Co.	750
Whittaker & Curry	Oneida Co.	500	Levi Tanner	Oneida Co.	950
D. Thomas	Oneida Co.	500	E. S. Bennett	Oswego Co	250

PLATE XIV.

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This picture illustrates the subject upon which the chapter treats, where it is placed as a sign is sometimes shown, to indicate the things within. It is the sign of the garden. In it were grown the cabbage, corn, cucumbers, turnips, tomatoes, pumpkins, potatoes, beets, carrots, parsneps, egg-plants, ornamental gourds, onions, and so on of all the rest. It indicates some of the subjects of this chapter, but not all. It would require a large picture to do that. So, after taking a glance at this, look well at every one of the next hundred pages. Every paragraph about "The Garden and its Fruits" has a deep interest to every reader. The picture is only a sort of wayside resting-place for the weary reader's eye. It is to amuse and lead the traveler on to more substantial fare.

FROM MY OWN GARDEN.

CHAPTER V.

THE GARDEN AND ITS FRUITS.

SECTION XXIX.—PLEASURE AND PROFITS OF GARDENING—ORIGIN AND HISTORY OF VEGETABLES.

IT is an error, and one that prevails to a considerable extent, to suppose that all labor bestowed upon a garden is so much "labor lost." Many farmers pass through a long life without ever having anything worthy of the name of garden—a name which signifies: "1. A piece of ground appropriated to the cultivation of herbs or plants, fruits and flowers. 2. A rich, well-cultivated spot or tract of country; a delightful spot."

And colloquially, in the Northeastern States, a garden is a spot not always delightful—where all the potatoes, beets, turnips, cabbages, onions, etc., grown for family use, are planted. It also includes a small patch of strawberries, a row of currants along the fence, and sometimes a few flowers. Often, however, it is as destitute of the latter as it is of all the other attributes of a "delightful spot;" yet the vegetable garden is one of the necessities of life that no farmer can afford to do without. As a general rule, the garden of a farm should be in the form of a parallelogram, running north and south, with orchard trees and shrubbery at the north end and a grass-plat at the south end, and everything should be planted in long rows. This admits of plowing the ground, with a place to turn at each end, both in breaking up the soil early in the spring and in after-cultivation. It is just as well to have a row of beets twenty rods long as to have twenty rows of one rod—indeed, much better, because you can do more in one hour in deepening the soil sufficiently for beets with a stout horse than a man can in a day with a spade. Even in a spaded garden, the old fashion of raising beds and deepening alleys has come to us from Europe, particularly Ireland, where there may be a necessity for the practice; there is none here. It belongs to the same family of antiquated notions as hilling up Indian corn. It is a foolish notion.

Although a garden should be rich, it must not be made excessively so with stable manure. We believe a continuance of any one kind of manure to excess will render a soil unfit for crops in general. For an over-rich garden soil the best remedy is lime, and the best way to apply it is in the form of "lime and salt mixture," which is made by dissolving salt in water until it will dissolve no more, and then using that brine to slake lime. A bushel of salt may thus be mixed with three bushels of unslaked lime and the mixture applied at the rate of 30 to 100 bushels of the slaked lime per acre. If the lime after slaking is kept in a pile under a shed, the outward portion effloresces, and it may be raked off and put away in barrels as it accumulates. The lime is then in the best possible condition for use.

Of the profits of gardens there can be no doubt. Any one who is familiar with the operations of the market gardeners near large cities, knows that the business is more profitable than ordinary farming. There is no reason why many other persons should not enjoy similar profits.

There is not one village in ten in all the Eastern States that is large enough to support a locomotive butcher that would not support a good market garden from the first year of its establishment, the produce being sent around to the houses in the same way that the butcher sends his meat. Of course, all the waste or refuse of the garden must be fed to the cow, pig, and poultry, and of course the owner would grow wealthy faster than the owner of a large farm cultivated in the ordinary way.

The great secret of success in market gardening lies in the succession of crops. Heavy manuring, thorough cultivation, and a good market are of course important adjuncts, but all of these will not give maximum results without the gardener's skill in keeping the ground fully occupied ; and in that, more than in all other things, is where not only gardeners, but farmers, fail. They keep too much unoccupied land, allowing a grain crop, oats, for instance, to be followed by a crop of miserable weeds more worthless than it is easy to imagine, for they are more exhausting than the grain, and of no use to man, animal, or soil. Land should never be left idle. In a well-arranged market garden one thing succeeds another so rapidly that one row of the first crop is off to day and its successor growing in its place to-morrow. The owner can not afford to wait till all is off, because by planting one after the other, he has the ripening crop for sale in the same order, and thus secures the whole value of the manure.

The work in a market garden properly begins in autumn. There are several vegetables that must be started at this season, and all the ground should be manured either then or during the winter. Much of the success of the garden pecuniarily depends upon having its products a little anticipate the usual season. Potatoes early in the season are worth two dollars a bushel. Three weeks later they are down to a dollar or less. There is a like falling off from most other articles, though hardly anything fails to return a paying price.

Spinach is sown in September and October to furnish cuttings in April and May. Cabbage is sown about the same time to furnish plants for the cold frame, which are kept through the winter, transplanted in April, and furnish heads in June. They are put into the frame in rows very near together in November, and when the winter sets in, are covered with boards, removing only in mild weather and increasing light and heat as spring advances, until the open ground is in condition to receive them. These are called cold-frame plants, and furnish heads about two weeks earlier than the hot-bed plants started in March. The best varieties for this early crop are the Early York and the Winnigstadt, which makes a very solid head of excellent quality.

Lettuce is also sown in the fall, and with a little protection keeps well through the winter. About the first of March operations commence with the hot-beds. These are prepared with various quantities of manure, according to the heat required. The beds are generally from four to six feet wide, for convenience in attending to the plants. They are covered with a sash about three feet wide, the glass being not more than seven by nine. In these beds a great variety of plants are forwarded—cabbage, tomatoes, peppers, egg-plants, and other early plants.

The whole ground is covered as soon as it is sufficiently warm, and arranged so as to allow a succession crop. In the first course come radishes, spinach, lettuce, cabbage, potatoes, peas, turnips, corn, kohl-rabi.

Early potatoes are off in time for late cabbage; early radishes in time for celery, sweet corn, or cabbage. Early peas are always followed by a crop of something that will ripen before frost. Early corn may be followed by turnips, or by spinach for spring, which will be off in time for tomatoes. Beets are followed by celery, and peppers are transplanted among the heads of lettuce a week or two before they go to market; or squashes or cucumbers are planted. Quassia chips, steeped in hot water, and that sprinkled upon the vines, are found to be efficient protection against bugs. Carrots form a good succession crop to the onions. They are sowed between the rows about the middle of June. Two crops, and sometimes three, are always grown from the same plot of ground in a season. Nothing but ignorance of these facts prevents a great many small owners of land in the vicinity of small towns from establishing market gardens for the supply of those who can not, or at least do not, grow a supply for themselves of the most common sorts of garden vegetables. It is a fact but little appreciated, that a very large portion of those who have lived all their lives upon a farm, and made its cultivation their only business, are utterly incompetent to manage a garden—that is, a garden intended for supplying any market with vegetables.

Illustrative of the pleasures and profits of gardening, we insert a report of a visit of the author to *the garden of an artist*, to show what an unprofessional gardener may do upon a little spot of ground. Geo. H. Hite, of Morrisania, lives upon a village lot, and is by profession an artist. Not an artist in gardening—not one who professes or pretends to practice horticulture upon a scientific or artistic plan. Nor do I mention his garden as a model of taste and skill which may be imitated by the wealthy at great expense. I mention it rather as the garden of a mechanic, and just such a one as a great many mechanics or professional men might have if they would—if they only knew how. I mention it full of hope that it may be the moving cause toward inducing other men who have daily employment, as this one has, at some trade or profession, to devote a little time, some money, and a great deal of sound common sense in the cultivation of the little half-acre plats that we often see surrounding village residences, which are mere examples of the utter uselessness of land except to enable the owner to show how barren and worthless he can make it. There is no need of this idle use of land. There is no reason why every owner of a village lot should not revel in all the luscious fruits of the season, and treat himself and his friends to an occasional bottle of wine, equal to any that he could purchase for a couple of dollars, just as Geo. H. Hite is now able to do, free of expense; for his garden pays its own way, and a little more, of all cost of cultivation, leaving him in the enjoyment of its delicious fruits, fresh from the earth, or their products preserved to continue almost as fresh throughout the winter. And he is not by profession nor early education a gardener, being a native of a State less noted for its horticultural skill and fruits than for its productions of great corn crops, great bullocks, great men—physically and intellectually. Mr. Hite is a Kentuckian, and some of his early years were spent in painting portraits in Louisiana. Then he came to New York, and during other years acquired fame as an artist upon ivory. Then, some years ago, like a sensible man, he began to create a home for his old age, when it comes; it is only in the blossom now; and that home I have visited, and I wish I could take every one who hears or reads of it with me to learn what an artist has done, and what a mechanic, a lawyer, a doctor, or anybody else might do in a garden upon a village lot. Will the sluggards who sigh after an abundance of fruit, and envy those who have, yet take no steps to have it themselves, believe me when I tell them that in this garden there are grapevines of such extent, luxuriance, and fruitfulness, that several barrels are required to hold the juice of the surplus of the crop? The fruitful arbor that extends some fifty feet from the rear of the house, affords a delightful shady spot, which, independent of the fruit, is well worth its cost. Isabella grape wine, five years old, with no addition whatever to the juice of the grape, is excellent. Strawberries grow to perfection in this garden; and as a cultivator of currants, Mr. Hite excels. Not merely a few basketfuls for family use, but bushel after bushel, red, white, and black. The berries of the true red Dutch variety are upon the average as large as the cherry currants under ordinary cultivation; and as for productiveness, no statement can convey an idea. To believe, you must see. And this is the result of pruning. True, Mr. Hite follows the Scriptural injunction about a barren tree, to "dig about and dung it," with all of his trees, and vines, and shrubs, and flowers, and table vegetables; but with the currant the secret of success is pruning. "Keep no old wood," is his injunction. Every branch that has borne three crops must be cut away at the ground, having been twice shortened in, by which the short fruit-spurs on the new wood are always loaded, and the bunches growing close to the canes, so that they look like ropes of red berries. To commence with a single plant, cut it away close to the ground, to induce several vigorous shoots, instead of one, growing tree-shaped. Next spring shorten all these canes, and let the fruit grow below and new shoots above, and next spring shorten these again. Some of Mr. Hite's three-year-old plants are now five or six feet high, so loaded with fruit that they have to be trained to stakes, which, by-the-by, is the true way to grow currants. Next spring these vigorous, fruitful branches, all that are three years old, will be unsparingly cut away. It is the secret of success. Meantime, new shoots come up in successive order to take their place. I have no doubt of the fact that currant bushes thus treated, of the sour sort that are now growing neglected along many a garden wall, untrimmed in half a century, may be made to afford a field crop of more than two hundred bushels per acre of superior size and flavor to those grown in the ordinary way, and that the cost of production will be far below twenty-five cents a bushel. The annual pruning would be the greatest part of the labor, and, in the vicinity of this city, the wood cut away would be worth nearly the cost of cutting; and in the country, where stone chimneys and brick ovens are still fashionable, the brush, when well seasoned, would make superior oven wood. Besides what I have said of this garden, there is much more to be learned from it, and that where it blossoms now, nine or ten years ago was a wilderness of wild bushes, blackberries, and rocks, and that he who has said "presto, change!" is not a magician, but a very humble individual, with no more power to produce such change than the most humble one of the mighty multitude who have an idea above the gutter, with a will to work that idea out in the rich productions of nature improved.

Besides the fruitful grapes I have alluded to, Mr. Hite has others, principally of the Delawares, now growing beautifully; and so satisfied is he with the advantages of growing superior grapes, that he dug up a fruitful bed of strawberry-plants to make room for more Delaware grapevines, which he thinks will be the greatest wine-grape in America. Some of the surplus products of his little plot of ground afforded the owner one year $400 in cash, which was more than enough to pay for hired labor and manure. This should encourage others to go and do likewise. I would have gone to this man for my miniature portrait, but who would think of going to an artist to learn horticulture? Yet I have learned, and in my opinion others may, from very unexpected sources. Let us try.

519. **Origin and History of some Common Garden Vegetables.**—The history of some of our fruits and vegetables is, in many respects, extremely curious.

"The *artichoke*, we find, was so highly esteemed in Rome, that an arbitary law was enacted to prevent commoners from eating it."

This statement shows the importance of calling all plants by their botanical or scientific name, since we can not tell whether the writer means the *Helianthus tuberosus* (Jerusalem artichoke), which is a plant of the sunflower species, or the artichoke which somewhat resembles a thistle, the *Cynara scolymus*, which grows the edible part at the top instead of the bottom.

The plant used for flavoring, called *basil*, which now stands so high that a London alderman would spurn a basin of turtle made without it, was, 200 years before Christ, condemned by Chrysippus as an enemy to the sight and a robber of the wits. Pliny says they sowed the seeds with maledictions and ill words, believing that the more it was cursed the better it would prosper.

Lettuce appears, from an anecdote related by Herodotus, to have been served at the royal tables of the Persian kings, five or six hundred years before the Christian era, but they only knew one sort, which was a black variety. This esculent has been greatly improved by cultivation as well as cabbage. We can remember when a *head* of lettuce would have been a great curiosity, and the heads of cabbage fifty years ago were very unlike merchantable cabbage-heads of the present day.

Mint appears to have been used formerly for other purposes besides making mint-juleps, which produce a disease which, in ancient times, mint was used to cure; for Pliny says, at a consultation of physicians in his chamber, it was decided that a chaplet of pennyroyal was better for giddiness and swimming in the head than one of roses.

According to Ovid, mint was used by the ancients to perfume their tables, by rubbing the leaves upon them before serving the supper; and *mushrooms*, both edible and poisonous, were known to the ancients. They were considered, when good, a great dainty with the voluptuous Romans; and one of the poisonous sorts was used by Agrippina to destroy her husband Tiberius Claudius.

Mustard, it will be recollected by Bible-readers, was cultivated in Syria at the time of our Saviour, as it is mentioned in one of his beautiful parables as being the least seed that was sown in the field.

Garlic and *onions* must have been in high favor as food at a very early day, since it appears that the Egyptians worshiped garlic, and were said to wish that they might enjoy it in Paradise; though the Greeks held it in such abhorrence, that they regarded those who ate it as profane. The Romans gave it to their laborers and soldiers to strengthen them, and to their game-cocks previously to fighting them; and the Israelites, while in the wilderness, lamented the deprivation of these stimulating roots, to which they had become so accustomed in Egypt. In this country, onions are eaten by all classes, and in New York city, we have noticed, are greatly esteemed in winter by the very poorest classes, particularly the dissipated. They are not generally considered unhealthy, though no dyspeptic should ever touch garlic or onions in any shape, particularly raw.

Parsneps were held in high esteem by the Emperor Tiberius, who imported them annually into Rome from Germany, probably because they grew much better in that colder climate, as they are greatly improved here by remaining in the ground to freeze during winter.

Parsneps contain a large proportion of sugar; beer is made from them in the north of Ireland, and wine, closely approaching the malmsey of Madeira, is made from the roots. Marmalade, made with parsneps and a small quantity of sugar, is said to excite appetite, and to be a very good food for convalescents.

Parsley was cultivated, as it is now in gardens, in the time of Pliny, and appears to have been highly esteemed as a seasoning of food.

Radishes were so highly esteemed by the Greeks, that they made them of gold to offer at the shrine of Apollo. If these were made of the size that radishes are represented as growing in those days, we certainly should prefer the counterfeits to the real; for it is stated that they grew to the weight of forty or fifty pounds. Probably they were an entirely different article from our radishes, and perhaps were a culinary vegetable.

Beets were made for the same purpose of silver, which shows the comparative estimation in which they were held. With us it is quite the reverse.

Turnips, too, do not seem to have been highly esteemed, since Apollo only got wooden turnips, while he got gold radishes and silver beets. This was somewhat owing to climate, undoubtedly, for we have observed that turnips are not esteemed in the cotton States, except for the tops to be used as greens.

Thyme was planted in Greece, and thence imported into the Roman States on account of its value as pasture for the honey-bees.

Water-cress was esteemed as a stimulating article of diet, as well in olden time as at present, and was often eaten with salad to counteract its effects, which were thought to be chilly. An old writer says:

"Water-cress is one of the most wholesome of our salad-herbs, and one of the oldest in use. Its qualities are warm and stimulating, the reverse of nearly all other raw vegetables. Xenophon recommended it to the Persians, and the Romans gave it to those whose minds were deranged. Hence the Greek proverb: 'Eat cress, and have more wit.' It is an excellent anti-scorbutic; and a salad so easily produced, and so important to the health of townspeople, can not be too highly recommended. The daily supply at Covent Garden, London, is about 6,000 bunches, but it is said if twice as many more bunches were brought in they would be all sold."

Cabbage appears to have been used for food from a very early period, and few vegetables have undergone greater improvements, from the original sea-kale to the large drum-head cabbage, some of which have heads almost as solid as turnips, and of twenty pounds weight. Germany, of all other countries, grows cabbage for food most abundantly. It is considered a necessity for every family to have a barrel or more of *sour-kraut*, which is made by cutting the cabbage-heads into small shreds, with sharp knives or a machine, which is packed in barrels with a little salt, and sometimes a flavor of spice, and in this way it keeps (we can not say sweet) in an eatable condition all winter, and is usually stewed and eaten with vinegar, in place of other vegetables, with meat.

Asparagus is another sea-plant, very much improved by cultivation. The first time we hear of this vegetable is in the time of Cato the Elder, two hundred years before Christ. The Emperor Augustus was very partial to it; and at Ravenna it grew to such a size that three heads weighed a pound. Mr. Grayson, of Mortlake, near London, has produced one hundred heads that weighed forty-two pounds, perhaps the largest ever known in Great Britain; and hundreds of acres around the metropolis are devoted to its cultivation. The small heads are sometimes cut into pieces and boiled, as a substitute for green peas. Medicinally, it is considered diuretic, and is said to promote the appetite. It is considered antiscorbutic, and very good in dropsical cases, but is avoided by those having the gout. The most extraordinary virtue is that ascribed to it by Antoine Mizold, who says: "If the root is put upon a tooth that aches violently, it causes it to come out without pain." Our modern dentists will, we are sure, thank us for this information, if it is true.

Asparagus and cabbage are both benefited by the use of salt for manure. For asparagus, there is no danger of using too much salt. It may be used in a crude state, or dissolved, or in compost.

Carrots, we are told, originated, or at least, were first cultivated for food, in Holland. They are not only nutritious, but the pectic acid which they contain has the effect to gelatinize other food, hence they are used in soups, making them richer. There is no root grown by farmers of quite as much value for stock as carrots. They are very nutritious food for our tables, simply boiled, and only require a little practice to be much liked. The white carrot is sometimes boiled, and mashed, and used in bread. The foliage of carrots is truly beautiful, and we read that, in the time of Queen Elizabeth, it was common for ladies to use the fresh, green leaves as ornaments of their head-dresses.

Potatoes have a history so wrapped in obscurity, that no one can tell for a certainty where they originated. Their adoption, as a general article of food, dates back only to a comparatively recent period; that is, since the settlement of America, yet they are now considered an indispensable article upon almost all the tables of rich and poor in all countries where the potato flourishes, as it does in the northern United States and England and Ireland.

The potato-plant (*Solanum tuberosum*) is said to belong to a family of poisonous plants, and an extract, powerfully narcotic, may be made from the leaves and stalks, and a weak spirit is often distilled from the roots; and a pretty good starch is made, both in a domestic way and in large manufactories, from potatoes, with which sago is often adulterated.

Potatoes make good yeast, and they are often used for making sizing; and the water in which potatoes are boiled is good to wash any fabrics in that are liable to fade.

Excellent as potatoes are for food, sad experience has proved that it will not do for any nation to rely upon them. This reliance brought famine, misery, starvation, and death to Ireland, and disappointment to a great many who have lost entire crops from the potato-disease.

Salad-plants have long been cultivated and eaten by the rich as a luxury, and by the poor as a necessity, or rather, in many cases, more as an agreeable economic article of food. In all cities and large manufacturing towns, the laboring class are every year becoming greater consumers of lettuces, radishes, and celery, and find benefit from their use. This kind of food is grown to great perfection, and is very largely consumed in France, Belgium, and Holland—more so than in this country.

Salsify is a plant that should be known more extensively than it is, because it affords an excellent article of food. Its roots grow like parsneps, and the cultivation is similar, but they have quite a different flavor, and on account of a real, though slight, resemblance in smell and taste to oysters, it is often called vegetable oyster-plant.

The greatest resemblance to oysters is, when the roots, which have stood all winter in the ground, are dug in the early spring, boiled and mashed and mixed with butter, and cooked and served hot, like oyster batter-cakes.

Okra is another valuable food-plant not much known and cultivated, except in market gardens in the Northern States, though it is considered an article of prime necessity at the South, being largely used by black and white. The negroes make a very favorite dish with okra and bacon, called gumbo, and we have eaten gumbo in New York, but it is very rare. The principal use of okra here is in soups. The seed-pods are the part used, either green or dry. They give the soup a mucilaginous character. The bark of the okra plant is very fibrous—as much so as hemp, and more tough.

Sweet corn (see 541), as it is now grown in a great majority of the gardens, affords one of the cheapest and richest luxuries that America enjoys. In the latitude of this city it is fit to eat in July, and continues in condition for the table, with a little extra attention, till late in October. There are several varieties, some of which are noted for keeping fresh very late in the season. There is no dish more universally liked than sweet corn while in the green or milky state, and every family who have the means of growing it should provide for a succession of crops during the season, so as never to be without it, because no food can be produced cheaper, and none is more nutritious, palatable, and wholesome.

We might go on to great length with this history and description of garden plants, and at last should hardly know where to stop without breaking off abruptly; so we do it here, to go more into particulars of garden cultivation of proper vegetables, plants, fruits, and flowers.

SECTION XXX.—GARDEN CULINARY VEGETABLES.

OUR plan of treating lightly a great variety of subjects will not warrant us in giving a complete "Young Gardener's Assistant." That can be bought in a separate volume, and it is a valuable book. But we shall give a little information about all the principal kinds of culinary vegetables usually cultivated by farmers, or which should be cultivated by them, which we trust will be found useful. In treating upon some of the same things under field-culture, in the chapter devoted to "The Farm and Its Crops," we shall probably give some further information, which may be useful to those who only plant a garden. And so will what we say here be useful to those who wish to grow vegetables upon a large, as well as upon a small, scale.

520. **The Brassica Family—Propagating and Saving Seed.**—This family of plants, which includes all that are near enough related to the cabbage to hybridize with it, is the most universally cultivated of any variety of culinary vegetables. In planting out cabbage, cauliflower, broccoli, turnips for seed, great care should be taken to set each kind by itself, at considerable distances apart, to prevent hybridization, and no seedsman must keep bees, for they are the greatest hybridizers in nature, carrying the pollen from one blossom to another, and mixing the two together indiscriminately. All the different varieties of cabbage, such as Flat Dutch, Savoy, Drumhead, mix very readily and spoil each variety, or else by one chance in a score of millions, produce a new variety which may be worth cultivation. As a general rule, however, all farmers who raise their own seed should try to keep the varieties separate. This may be done in most cases by setting out the seed-stalks in different fields. It is not necessary to confine them to the garden. Where there is any great inconvenience about keeping the sorts apart, you had better plant only one sort for seed, and buy seed for all other sorts you may wish to cultivate. Do not try to grow your own seed, if it will cost you twice as much as it would to buy a small paper of a professional seedsman. The principal advantage in growing your own seed is to select carefully the very best and throw away all others, and unless you do that, you had better not grow any. To grow good cabbage and turnip seed, select the very best roots to plant, and then select the best seed branches.

A correspondent wants to know if turnip seed, harvestea from roots that were left out over winter, will produce good turnips if sown for a crop. "My neighbors," says the writer, "tell me it will not produce turnips, but charlock."

We do not believe that it will change in a single season, but we do know of one instance where such seed was sown, and it produced turnip-tops and seed, but few bulbs of any value; and we believe that if the seed of these bulbless plants had been sown again and again, the whole semblance of turnips except the tops would have been lost. And this being the fact, why may we not believe that the reverse will be the case, where the most perfect bulbs are selected for propagation?

521. **Cultivation and Value of the Turnip Crop.**—The value of the rutabaga turnip for stock-feeding (see 880) seems to be almost universally conceded, while the common flat turnip appears to be under a cloud of prejudice in this country. We have, however, strong faith, from personal experience, in its value as winter food for horned cattle and sheep. There is great difference in the value of the several varieties. One of the best is the Red Strap, which grows well up out of the ground, and all the upper part of the bulb is of a rich plum red. This sort, if sown upon good land, grows rapidly and solid, and such turnips always keep the best and afford the most nutriment when fed to stock, and every vacant spot in the garden may thus be profitably occupied.

For garden culture, turnips should be sown at three periods: first, as early as the ground is dry and warm enough for the seed to vegetate; second, about the first of June; and the third, after the peas have ripened, and in all other vacant spots from which a first crop has been removed. If seed is sown as late as the middle of October, or, according to latitude, as late as it will grow bulbs the size of pigeons' eggs, and these are covered over with a mulch of coarse manure, straw, or leaves, and the mulch raked off very early in the spring, you will get a fine crop of sprouts for early greens, and sometimes the bulbs will grow again so as to be good eating. Remember, never save seed from such roots.

522. **Protection of Turnips from Insects.**—The young plants are liable to suffer from the attack of certain insects, especially the turnip flea, or beetle—called in England "the fly." As a protection against such enemies, we recommend the following recipe: Mix one tablespoonful of sulphur with a pint of blood-warm water to half a pound of seed; let it soak a few minutes, then pour off the water and mix the seed with ashes or plaster. Whether this would afford any protection against grasshoppers, could be determined by trial.

There has been lately offered in market a new preparation of "attenuated coal-tar," that is, coal-tar mixed with a dryer, making a granulated substance resembling gunpowder, which is said by those who have used it to be a good preventive of insects. We know that the scent of coal-tar is offensive to most of the farm-pest family. A board-fence painted with coal-tar appears to act as a protector of fruits trained alongside of it. Coal-tar mixed with dried loam in the form of a powder should be tried as a preventive of insects on the young turnips. In this form the expense would be very trifling. It may answer for all other garden plants just as well as the more expensive preparations sold for the same purposes.

523. **The Kohl-Rabi—Its Character and Use.**—This relative of the turnip and cabbage is comparatively a new garden plant, but one much approved by all who are acquainted with it, and extensively grown for the New York markets. It appears to be a cross between the cabbage and turnip, growing with a bulb like the latter, which has the outward appearance of a cabbage-stalk, with leaves like ruta baga. These bulbs, cooked, have more of the flavor and general character of cabbage than turnips. Those who are not acquainted with them should procure seed and give them a trial. They are largely grown in England as a field-crop for stock, the seed being planted by drills, four pounds per acre, and produce twenty-five tuns. For garden culture, pursue exactly the same course as with cabbage.

524. **Cabbage Cultivation, and Value as Food.**—Almost every family cultivates cabbage in the garden as an article of food, for which purpose we look upon it as of very little account. We know it is relished by a very large portion of the laboring class, and that class alone should eat it, as it is, particularly when cooked, one of the most indigestible articles of food ever taken into the human stomach. Eaten raw, in small quantities, it is more digestible, and serves very well as a relish in place of other green food at seasons when the garden does not afford a supply.

We recommend the cultivation of cabbage in all gardens, even where the family do not care to grow it for the table, because a plant can be stuck in here and there to fill up waste places, and if the plants are not wanted by the family when grown, the cows will be very glad of them after the grass is frosted in autumn. If cabbage is wanted for very early use, the plants must be started in cold frames in autumn, and kept covered up all winter. Such plants are much more hardy than hot-bed plants started in spring. Seed may be sown, as soon as the ground is warm enough, in garden beds, for early cabbage, but for such as are wanted for winter use, seed sown late in May or June, or even in July, will be early enough to set where peas and early potatoes have been harvested. Cabbage requires a strong soil, and will bear heavy manuring, except with hog-pen manure. That, it is pretty well settled, causes the disease known as "club-foot" in cabbage. This whole order of plants delights in bone-dust as a fertilizer and bones prepared as superphosphates are still better.

The distance between the plants when set out varies from one and a half to three feet. A moist, cloudy day is the best time for transplanting, and it is well to dip the roots before planting in a composition of black mold and a little soot, made into thin mud with the addition of liquid manure.

Cabbages may be headed in winter by setting them with their roots in good rich earth, just as they grew, and covering the tops so that they will not freeze. This may be done with a roof of boards, hay, or dirt, or brush and rails and straw covered with dirt, with little air-holes. Cabbage grown in this way is blanched, sweet, and tender, and will pay much more than the cost of thus arranging the late stalks which failed to form heads in the fall. The work should be done just before the ground freezes, and at first only slightly cover the tops.

The heads can be kept very sound and clean, and convenient for daily use in winter, by packing them in wet moss in barrels or boxes, which should be kept in a room where the temperature is just above the freezing-point.

The easiest way that we ever put up cabbages for winter use was as follows: Lay two common fence rails, or two poles on the ground, side by side, about six inches apart, and as you pull up the cabbages, lay them down, with the heads resting upon the poles and the roots on the ground on each side, at right angles with the poles. If you take off the loose leaves for feed, lay a thin coat of straw over the heads, and then throw up the dirt from each side, so as to cover the heads about six inches deep, and form a smooth mound, shaped like a winrow of hay.

Of the kinds of cabbage, we recommend the "Bergen," for its large size and value for fodder. The "Fawn-colored Savoy" is more delicate for the table. "Red cabbage" grows with very hard, small heads, and is esteemed for pickling. It is not as sweet or palatable as other sorts to our taste. A kind called "Thousand-headed" is much grown in some gardens for eating green. It is a coarse variety. The "Green Curled Kale" is also grown for greens. It does not head. So is the kind called "Brussels Sprouts." The earliest variety of cabbage is the "Early York," or "Early Wakefield." Three other early varieties are called, "Early Sugarloaf," "Early Drumhead or Battersea," and "Early London."

A new variety, lately introduced, is called "Stonemason." It originated with J. J. H. Gregory, of Marblehead, Mass. It grows a large, rich head on a very short stump. The "Marblehead Mammoth" is another new variety, introduced by Mr. Gregory, which grows heads that weigh thirty pounds each. There is a new kind called "Pomerain," which grows heads shaped like the Red Dutch, that is, conical, though much larger, and remarkably solid.

525. **Cauliflower** is a delicate vegetable of the brassica family, the edible part being the flower-buds, before they shoot up to seed. Cultivators have succeeded in forming these into a very compact mass of several pounds' weight. This is done, first, by using seed of the very best variety and cultivating in very rich ground; and second, by carefully tying up the leaves around the heads, to make it grow compactly. A heavy, moist, fresh loam is the best soil for cabbages and cauliflowers.

The way the Dutch obtain cauliflowers, famous for size and delicacy, is as follows:

"In the autumn they dig deep some ground that has not been manured; at the beginning of May they sow the large English cauliflower upon a bed of manure, and cover it with straw mats at night. When the young plants are three or four inches high, they harrow the ground that had been prepared the autumn before, and with a wooden dibble, eighteen inches long, they make holes about ten inches deep, at proper distances apart, and enlarge them by working the dibble round till the hole at the top is about three inches in diameter. They immediately fill these holes with water, and repeat this three times the same day. In the evening they fill them with sheep-dung, leaving only room enough for the young plant, which they very carefully remove from the bed of manure and place in the hole with a little earth. Directly afterwards they give them a good watering, and as soon as the sun begins to dry them, water them again. Furthermore, as the plants grow, they dig round them, and earth them up in rows. When the head is forming, they pinch off some of the lower leaves of the plant, and use them to cover the young head."

526. **Broccoli** is nearly allied to cauliflower, and though inferior in quality is much cultivated. One of the secrets of growing cabbage is frequent hoeing, and in case of drought, watering. The ground can not be stirred too frequently, and it is well to hoe when the dew is on, if you are a little careful about getting dirt on the plants.

Although cauliflowers are a little more difficult to grow than cabbages, we have no doubt they are much more nutritious and digestible as food. We have said more about the cultivation of the brassica family in gardens than we shall of any other, because the various sorts may be grown in a great measure as a second crop, or to fill up waste places, and therefore it is economical, because it affords such a great quantity of food.

527. **Carrots, Beets, Parsneps, Salsify, and Horseradish.**—All these plants require one grand feature in their cultivation, and one which many farmers neglect. It is a perfect trenching of the earth, not less than two feet deep, and far better if it is three feet. They all succeed best on a rather light loam, not too sandy, which was manured the previous year with old manure. If desirable to continue planting the same plat with these roots, let them come in rotation, and use no manure that is not in a very pulverulent condition. Guano, at the rate of three or four hundred pounds per acre; superphosphate, at the rate of five hundred pounds per acre; lime, at the rate of fifty bushels per acre; unleached ashes, at the rate of ten to twenty bushels per acre, are all good fertilizers for root crops. All these roots are apt to grow pronged and ill-shapen in fresh-manured ground, as they always do in ground badly spaded or plowed, unless prepared by the very best kind of surface and subsoil plowing.

528. **Carrots,** for early use, may be sown as soon as the ground is dry. For winter use, the last of May or first of June in the latitude of New York. They are best preserved for winter use in dry sand. The best early variety is Early Horn; the best for winter, or stock, is the Improved Long Orange, though some prefer the Altringham. The large, white, Belgian carrot has been cultivated here, but the yellow is still the favorite.

529. **Beets** should be sown very early for greens. The Early Flat Bassano" or Early Blood Turnip-Beet will produce food soonest; but for win-

ter, we prefer the Long Blood Beet or Smooth Long Dark-red. The last should not be sown till near the first of June. If it matures early, the top part, which grows out of ground, is very woody. Always soak beet-seed twenty-four hours, and then roll it in plaster, ashes, dust, or meal, to dry it for handling while planting. An ounce of seed will plant a row one hundred feet long.

530. **Parsneps** should be sown early, and may be left where they grow till the ground is wanted for a second crop. The soil must be trenched and rich, or manured deep below the surface, to grow good parsneps. An ounce of seed sows a row two hundred feet long—five pounds an acre. The Long Smooth is the best variety. Parsneps are excellent food for stock.

531. **Salsify,** or *Oyster Plant*, should be sown early in spring; an ounce of seed to a row thirty feet long. Like parsneps, they are improved by standing all winter where they grew.

Horseradish, is a plant of the genus *Cachlearia*, which is a sort of scurvy-grass, and is unknown to, or, at least, uncultivated by many farmers. Its sharp, pungent root is very agreeable to most persons as a seasoning to meats, and it is considered a healthy excitant of appetite. It is easily grown from cuttings in any deep, rich soil, even a mucky one that is quite wet. It is best after standing out all winter. In the vicinity of cities it is extensively grown as a market crop, and is very profitable. For family use a few plants will suffice.

532. **Onion Culture.**—There are three principal sorts of onions grown from seed produced on the top—the red, yellow, and white. There is a kind called Early Red, and the large Wethersfield Red; the latter grows the largest, and is best for field culture. The Danvers yellow variety is mild flavored, early, and keeps well, and is preferred, where best known, to the Yellow Dutch, which is known in some places as Strasburg or Silver-skin. The White Portugal onion is the mildest, and good to grow for family use, but requires great care to keep it over winter. In some parts of the country scarcely any but top onions are grown. This kind produces miniature onions on the top of the stalk, which are set to grow bulbs for use. Onions require a rich sandy loam, highly manured with thoroughly rotted compost, deeply and finely worked and rolled, and the seed sown, one ounce to a row fifteen feet long, in drills fourteen inches apart, and the plants left standing four inches apart. Unlike most other things, onions do best upon the same plat year after year. Wood ashes, applied as top-dressing, make one of the best fertilizers that can be given to an onion bed. To prevent the ravages of the onion maggot, which of late years has proved so destructive, it is recommended to sow poppies with the onion.

533. **Peas—Choice Kinds and Cultivation.**—The following are the best early peas in their order: Daniel O'Rourke; Early Princess; Early Emperor; Prince Albert; Early Kent. The following are dwarf varieties: Tom Thumb; Bishop's Early Dwarf, quite prolific and early; Bishop's New Long

Podded, productive and good quality; Dwarf-blue Imperial, highly recommended as a summer pea. The following are larger sorts, and are highly recommended: Champion of England; Fairbeard's Nonpareil; Champion of Scotland; Eugenie; Napoleon; Missouri Marrowfat; Large White Marrowfat, a late sort; Blackeyed Marrowfat, an excellent kind, worthy of general cultivation; British Queen, very prolific, long podded, and fine flavored; to which add the sugar pea, with edible pods.

Judging from the little attention paid by many farmers to the cultivation of garden peas, we suppose they look upon them as luxuries, only to be indulged in by a few, except in very small quantities. In this they are quite in error. There is nothing grown that is more nutritious and wholesome, and much more attention should be paid to their cultivation, so as to have a full daily supply, early and late. The first planting should be made just as soon as the ground can be worked in spring, upon ground well manured the year before, or else with very fine old compost or guano in the hill, but not in contact with the seed. In small gardens, or where ground is scarce for early crops, plant potatoes and peas together. Land can not be too rich for peas, but if it is the richest of crude manure, more vines than seed will grow. Ashes and plaster upon peas while growing, when a few inches high, will help them remarkably. Plant in double rows, a foot apart, so as to set bushes between. The largest sorts require four to six feet between the lines, and we have found it advantageous to put them wide apart and plant a row of potatoes between. You want a pint of seed of the dwarf sorts, in a double row, fifty or sixty feet long. The large growing sort will take a pint to a hundred feet.

Pea-bugs injure but do not destroy the germination of seed peas. It is recommended to keep them in sealed bottles, and if a piece of gum camphor as large as a pea is put in, it will destroy all bug life. One writer recommends planting peas five inches deep early in the spring to prevent the weevil. He plants beets at the same time between the rows of peas. Another writer recommends fall planting, or any time during winter when there is no frost in the ground.

534. **Beans for the Garden—Good Sorts.**—We recommend careful attention to the cultivation of garden beans, because they furnish such good, cheap, palatable food. The following half dozen sorts are the best that we can name of the dwarf or bush variety, which give edible pods, called snap or string beans:

The Early Valentine grows excellent, long, tender pods. Early Yellow Six-weeks is very productive. Early Mohawk is not only prolific, but hardy. The Early China is an old favorite; it is a white bean, with red eye. The Thousand-to-One sort is also an old and very popular kind. As young bean-plants are easily killed by frost, you must not plant them till that danger is past and the ground is light and warm. A pint of seed will plant a drill eighty feet long. Cover lightly without manure, and never hoe when the vines are wet, but stir the soil very often, and use plaster and ashes.

Of pole-beans, the Early Dutch Case-knife takes the lead. It is early, prolific, and good green or dry. The pods are sometimes eaten, but can not be recommended. The pods of all the Cranberry beans are good. The "Horticultural Cranberry or Wren's Egg" grows in beautifully red-striped pods, is of a light red and cream color, speckled, of medium size, and very good, both in the pods and shelled. The White, or Marrowfat Cranberry, is very tender and nice, but is a shy bearer. The old Red Cranberry is more prolific and hardy, but the pods are less tender, and beans not so delicate in flavor, but it is a valuable sort to rely upon. The beans grow of good size, roundish, and deep-red color.

535. **Lima Beans** are a distinct order of plants from the others, and more difficult to cultivate, as they require a longer season of warm weather, and if planted before the ground is warm, are apt to rot, and each seed requires to be handled separately and put in the ground with the eye downward to insure their coming up.

The best manure for Lima beans is superphosphate of lime. They grow in long, flat, rough pods, and the vines are such great climbers, that they would go to the top of poles thirty feet high. The best way is to use poles five or six feet high, and pinch back the vines, or train them horizontally. To get an early start, set each bean in a piece of sod two inches square, and place these sods in a shallow box in the kitchen, and keep them well watered till it will answer to set the beans out around the poles.

536. **California Beans.**—A variety of beans new to the Atlantic States, introduced from California, has been highly recommended. A letter, written by L. Norris, Windsor, Ashtabula County, O., says of it:

"This bean is of medium size, of a peach-blow color, and very prolific. It requires only one, or at most two plants in each hill, as it produces many lateral vines. It is a short runner, only from three to four feet in hight. I find by planting them with corn, one bean in each hill answers the purpose well. By cooking these beans in the following way, they constitute a savory dish, and need only to be tasted to be appreciated: Having cleaned the beans, put them in cold water; add a little salt, and boil until done, but not so much as to have the beans crack open. Have ready a frying-pan, with some lard, which heat until it nearly boils; then take the beans out with a skimmer and put them into the frying-pan and fry them until they absorb nearly all the fat; then add about a pint of the bean liquor (of which you must reserve a plenty); then boil, or rather fry, a few minutes, stirring it gently; but be sure the liquor does not all boil away, as it is this which gives the beans such a delicious flavor. They are now ready for the table."

537. **Flowering Beans** are grown almost exclusively for ornament, and are known as "Scarlet runners" or "White runners," being great climbers, and profuse in beautiful flowers, and not very prolific bearers. It is a mistake to suppose these beans are not edible; they are so, but not of such delicate flavor as to be recommended for that purpose; they are very ornamental, and may be planted to climb a pole in a showy spot in the garden, or near

the house trained to trellises, or climbing strings up the house side, around windows, or along a piazza front.

538. **Asparagus.**—But few farmers have this delicious, early spring vegetable in perfection, because they do not know how to cultivate it properly. It is a perennial plant, which, if once well set, produces its crop of tender, rich shoots, year after year, with very little annual cultivation. It may be started from seeds or roots, which should be set in a deeply-trenched bed, well drained, and made just as rich as rich can be, and heavily salted. Every autumn, cut off the tops, and cover the bed with a thick coat of manure, salted; and in the spring, fork up the ground lightly, before the sprouts start, mixing in the manure, and if any of it is unrotted, lay it as a mulch between the rows. Lime and ashes are both excellent for surface-dressings. There are three varieties of asparagus—the Large Green, Purple Top, or Giant; the Improved Ghent; and Common Green—though some contend that the difference is more in cultivation than anything else. The common kind is certainly improved in size by high cultivation.

In May, 1860, a Mr. Fecks, of Oyster Bay, L. I., exhibited, to the American Institute Farmers' Club, specimens of a giant asparagus, grown at Oyster Bay, originated from seed at Matinicock, L. I., the bed of which is now over thirty years old. Some of the stalks were nearly an inch in diameter. He stated "that he had about four acres, which he called only a 'small patch,' because other persons had more than twice as much, and he had been told that one man near Jamaica has seventy acres. His beds are made upon good potato-land, plowed deep, and highly manured with stable or hog-pen manure. At one year from seed, the plants are set in rows four feet apart, and fifteen or twenty inches apart in the rows. We trench fourteen inches deep, with manure at bottom, which is covered with three inches of soil, and the roots set, and the trench filled gradually during the summer. In cultivation, we plow off the earth and put manure in the furrows abundantly. My bed is so near the level of salt water that the tide rises upon it at very high water, and the yield is $300 an acre. We do not cut it much, if any, the first two years. We put fifty loads of manure per acre, and five hundred pounds of guano. Some growers use 1,500 pounds of guano per acre. The bunches of sixteen stalks weigh four pounds. The best asparagus is that which grows above ground. The white is always tough. We sometimes have bunches with eight inches of tender green."

It is a mistaken notion to cut or try to eat the white part of asparagus stalks. None but the tender green part is fit to eat. An article now before us has the following sensible remarks upon this subject. The writer says:

"The stalk is generally cut about four inches long, often not more than two or three inches, and from one third to one half the length is white, showing it grew below the surface of the soil; this part is always tough and bitter, and unfit to eat. In truth, it is never eaten, so that fully one half of the weight of a bunch of asparagus, purchased in the market, is a dead loss.

If the stalk be cut four inches long, and two inches below the earth's surface, about one inch and a half of the top part is fit for use—no more. Asparagus should never be cut till it is five or six inches out of the ground. I often let it grow ten or twelve inches high. When five or six inches high, it should be cut about a half inch above the ground; but when ten or twelve inches high, it should be cut six or seven inches above the surface of the earth; or, if it be cut near the ground, all the bottom part should be rejected.

"After cutting it, take a sharp knife, and commencing at the lower end, feel your way along toward the top, till you come to where it is perfectly tender, then cut it off, throwing away the lower part.

"It is only the green, tender part that is above the ground that is sweet, healthy, and nutritious, or fit to cook and eat. The white, tough, and bitter part, that grows below the earth's surface, is not half as good as corn-stalks, and should not be allowed to be sold in any market in the civilized world.

"For private families, asparagus-beds should be made at considerable expense, and with much care. Four or five dollars will make a bed that will amply supply, for many years in succession, a family of eight or ten persons, if properly taken care of. To make a first-rate bed for that number in a family, make it about five feet wide and twenty feet long. Dig out the ground two and a half feet deep, and fill up with chips, sawdust, tan, or sticks of wood, packed close together, five or six inches from the bottom. Then put in five or six inches of the strongest stable manure, and fill up to the top with manure and dirt, about half-and-half.

"The bed is now fit to plant. Put your roots about ten inches apart, each way, over the entire bed, and then cover them about three inches deep with the richest soil to be had, and sow evenly over the whole a peck of common salt and a peck of ashes, mixed together. Asparagus is a marine-plant, requiring salt and alkalies for fertilizers, which should be supplied every spring to make the plants flourish.

"Keep the beds clean of weeds and well manured, and for this quantity of ground you will have a rich and abundant supply for eight or ten in a family, every day, if desired, from about the first of April till the last of June. The yield will be ten times as much as could be obtained from the same number of square feet planted in peas or beans. There is not, among all the green vegetables brought to market, another so productive, palatable, nutritious, and healthy as this plant.

"Where it is raised for market, a warm, rich, vegetable mold should be selected. A sandy loam is better than clay."

539. **Celery.**—This is another good vegetable for early spring, when there is a longing for something green or fresh from the garden, which is but little known to farmers in general. It is a hardy biennial, grown from seed sown in the spring, which will produce seed the second year. For the table, the stalks only are used, and generally raw, though good cooked, and to make

them tender and palatable, are grown in a peculiar way, which blanches and makes them crisp, tender, and pleasant to the taste, being aromatic and slightly pungent, sweet, and agreeable to all who are accustomed to eating them. There are several varieties in cultivation, some of the best of which are named as follows: White Solid, Seymour's Superb White, Cole's Crystal White, Cole's Superb Red, Dwarf White French, Incomparable; this is a dwarf sort, of a short, stiff, close habit, growing crisp, solid, and white, and keeps juicy and perfect longer than some other sorts. Laing's Mammoth Red is the largest sort, and is highly esteemed in England, but not as much so here as Nonesuch, which is said to possess an excellent flavor, and keep well in spring without seeding. Mead's Improved White is a new American variety, getting into good repute. Celery-seed should be planted early in spring, and covered shallow in rich, mellow soil, beating the earth down compactly over the seeds with the back of a spade. When the plants are three inches high, thin them out to four inches apart, and keep them clear of weeds till six inches high, and then transplant into trenches about a foot deep, first filling them half full of fine manure, well mixed with soil, and set the plants six inches apart, first shortening roots and tops. As they increase in size, draw in the sides of the trench, and continue to earth up, keeping the stalks and leaves all drawn close together, so the tops only show a few inches above the ridge. There is no better fertilizer than salt for this plant. Sprinkle the ground each time before earthing up, and take care each time to hold the stalks together, so that no dirt will fall into the center of the bunch. An ounce of celery-seed will produce some five thousand plants. Both in the plant-bed and in the trenches, celery will drink up a great deal of water or liquid manure. Some recommend keeping the plants in the trenches constantly saturated with water, tinctured with guano, or strong manure and salt. If kept constantly moist, the earthing-up process may be deferred till late in the fall. One says:

"Late in autumn the whole bed is covered with forest leaves, a foot or foot and a half thick, with a few cornstalks to prevent their blowing away. From this bed the celery may be readily obtained at any time, fresh, sweet, and crisp, during the winter."

Another covers the ridge with coarse manure, so it will not freeze; and another takes up the plants, and packs them in an upright position in a trench three feet wide, and covers the whole with coarse manure. This is only necessary where the plants are required in winter for market purposes. For family use, a few can be kept in wet moss, while the ground remains frozen. As a general rule, we believe the blacker the earth that celery is grown in, the whiter will it blanch. Some persons blanch with boards, set up against the plants, covered with charcoal-dust. A writer in the *Gardener's Chronicle*, London, recommends the use of sawdust, which he finds answers the purpose better than any other material, especially for late crops to be kept during the winter. He says:

"Having had some trouble in keeping late celery from rotting, where the soil was very retentive and damp, and the plants earthed up in the usual manner, I used sawdust, and found that it answered perfectly. Last winter all the late celery was earthed up with sawdust, and it kept quite sound till April, and no slugs or insects attacked it underground, the heads being very solid, clear, and crisp, and well flavored. I had some doubts that the sawdust from resinous trees might give the celery a disagreeable flavor, but on trial I found this not to be the case. Before the late severe frost occurred in October I had just finished the earthing up of all the late celery with sawdust, and I find it is now wonderfully fresh. the frost not having penetrated far through the surface to the hearts."

Another correspondent recommends charred earth in preference to sawdust, "as it will not only answer the purpose as well, but will allow the rain-water to percolate more freely to the roots of the plants, and be of infinite service to a soil of a damp, retentive nature." The sawdust, he thinks, will induce an injurious growth of fungi in the soil.

540. **Chiccory.**—This is a garden plant, scarcely known to American farmers, though extensively grown in England, and within the last ten years it has become a favorite article of growth and consumption. It grows somewhat like carrots, and its cultivation is similar, and its principal use is to furnish a substitute for coffee, or an article to mix with it, as it is to a great extent with all that is sold in a burnt and ground state for the purpose of reducing the price, or if sold at the price of pure coffee, giving the manufacturer a larger profit.

The carrot-like roots of the chiccory are washed, scraped, and cut into small pieces, and kiln-dried, and then roasted and ground like coffee. To give the chiccory an oily appearance like coffee, lard is put in the roaster at the rate of two pounds to a hundred of dried roots. It is colored with Venetian red, or logwood and mahogany dust, where the chiccory is to be sold nearly pure for "pure coffee."

Although not much grown here, we believe some coffee roasters in New York know its value to them, and import it in considerable quantities. No doubt it may be profitably cultivated, not only for sale or use as a substitute for coffee, but for a good forage crop in the tops. Sow it in April in drills a foot apart for hand hoeing, just as you should carrots, on rich, deep soil, on such ground as would produce a good carrot crop, and harvest in autumn. Some grow the leaves blanched, to use as a salad, by taking up the roots in autumn and trimming off the tops, and setting the roots in sand in a dark cellar, when young blanched leaves start out. The roots live over winter like parsneps, but, like them, are tough and stringy the second year. The leaves resemble dandelion, and tops and roots have a delicate bitter taste, and are slightly aromatic. For a forage crop, the tops grow very rapidly and thick, and may be cut four or five times. The roots, too, are very good for stock. We recommend its cultivation in gardens, in a small way, until its value is well tesfed.

541. **Corn in the Garden.**—There are several varieties of sweet corn suitable

for early and late use. We will mention a few, and advise all farmers to select such an assortment as will serve to give them ears fit for the table through the longest season possible. The earliest may be started in hot-beds, and transplanted as well as any other plants, or it may be planted, as we have recommended for early beans, in square bits of sod, or in small pots kept in the house, where it is warm and constantly moist. Smith's Early White is a dwarf variety, which may be planted for the first yield in hills only two and a half feet apart. Darling's Extra Early sweet corn is thought by some to produce ears the earliest of any variety; and the Early Red Cob is also a very early sort, growing short ears, eight or ten rowed, which fill well out to the end. The Early Tuscarora is a large variety, and matures early, but not as much so as the dwarf sorts. It is eight rowed, with broad, white grains, and remains fit for boiling a long time. This sort requires a very rich soil. For the main crop, the kind known as Large Sweet is perhaps the most productive; and for very late eating, Stowell's Evergreen or Burr's Mammoth Sweet should be planted in rich hills, three and a half or four feet apart, as late as the middle of July. We have seen it yield well, planted late in August, by protecting the hills with stalks of the early sorts tied around them. It is also kept good till December by cutting or pulling up the hills and setting them in a dry cellar or out-building. Both of these late sorts grow ears with twelve to eighteen rows, large grains on white cobs, and very bushy stalks. There should be a planting of corn for family use every fortnight from April to August.

Where land is scarce, we recommend planting corn and potatoes in the same hill. The corn will be just as good as though no potatoes were there, and if the stalks of the corn are cut away as soon as the ears are mature enough to boil, the yield of potatoes will be a fair one—in our experience just as good as hills alongside without corn.

542. **Early Garden Potatoes.**—It is quite important to farmers to know what are the earliest sorts of potatoes, since they are the most staple food article grown as garden vegetables, and we therefore name some of the most approved varieties. We have always found the nutmeg potatoes the earliest of any, but objectionable on account of their general small size, and because they do not yield well. There is a sort called "Mammoth Nutmegs," which grow larger and yield better. The Nutmegs have a very smooth skin, light yellow, with white flesh, and keep well, but are good for nothing for winter use. The Early June is a good potato, and more productive. The Extra Early White is said to be productive, and capable of producing a very early crop. The Early-Wendell and Early Carpenter are both spoken of by those who grow them as the best early variety known. We have been well satisfied with the Buckeye as an early growing potato, but it did not keep well with us. The Dykeman is not as early as some others, but answers first-rate to mature a week or two later. Either of these may be grown to great advantage in the garden, and we recommend that all of them should be tried, and proved which is best for each particular locality.

543. **Cucurbita—Gourds.**—The family of *cucurbita*, embracing everything from gourds to cucumbers, appears in an almost countless variety of forms, under some of which it is to be found in almost every garden. In our youthful days, almost every family raised a few gourds, and very convenient things they were, not only for water dippers, but holders of a great many little articles. We used them for storehouses of small seeds. At the South, and in some of the new portions of the West, gourds are still grown to a considerable extent, and when we traveled through most of the Southwestern States between 1840 and 1850, we should have thought something was lacking if we had not found a pail and one or more drinking-gourds at some convenient spot about the house—generally on the front piazza, where every traveler could help himself to a drink of water. Often, too, on visiting the springs by the roadside or in the plantations, we have found the indispensable gourd hanging to a tree. They are grown of all sizes, from a gill to a gallon; and one kind that grows without the elongation for a handle we have seen of the capacity of half a bushel, and the shell so hard that they would last many years for dry storage. In Texas, a variety with a depression in the middle, and bulb of equal size at each end, is frequently used to carry water on horseback, it is so convenient to lash to the saddle. A little drinking-gourd, as hard as wood, and almost white, holding about a third of a pint, was given us by a lady in Mississippi, which accompanied us during many thousand miles of journeying, and out of which we had many a sweet drink of water from roadside springs. No one thought it worth while to steal a gourd from the wagon, while a tumbler, tin cup, or earthen mug would probably have disappeared the first night. We heartily commend this good old fashion of growing gourds to the attention of all farmers. It will save many a dollar used up in tin cups and dippers, and costly, fragile glass and earthenware.

544. **Cucumbers.**—These rarely fail if planted in hills made as rich as it is possible to make them, six or eight feet apart, leaving only two or three plants to run to vines from each hill, and sometimes that is too many. The ground must be kept free of weeds in all the stages of growth of vines, to insure a good crop. A very good way to raise a few early cucumbers for family use is to fill a barrel or larger cask with hog-pen or other rich manure, covered with sand, and set it in the grass-plat, near the house, where it can be watered every day—no matter how often. We have seen a good lot of cucumbers grown by earthing over the ash-leach and letting the vines hang over the sides. This also requires frequent watering, for that is the great source of all great garden productions. Without it, high manuring is worthless.

Perhaps the earliest variety is one lately introduced, called the Early Russian. It is prolific, and matures for the table ten days sooner than the Early Cluster, or Early Frame, or Short Green. The Early White-spined sort is considered best for the table. It is larger than the other early sorts, straight, smooth, and dark green. For pickles, there are several good sorts:

the Long Green Prickly; Long Green Turkey; Stockwood Ridge; and Carter's Long Ridge.

For early use, cucumbers may be planted in sods inverted in a box that can be taken in and out of the house, according to weather, until it is warm enough to set them in place. You can not make the hills for cucumbers too rich. Some market gardeners divide the hills in quarters, and plant one fourth at a time, a week apart; so that if one planting fails, another will succeed. The plants should be hoed frequently, and the bugs watched carefully. Seed improves by age; an ounce will plant a hundred hills; though as they are planted on Long Island for market, an ounce would be needed for a dozen hills. The market gardeners put in such a quantity of seed, that the bugs are not able to eat all until some get too big for them.

545. **Musk-Melons** should not be planted till the earth gets warm, and then in hills dug deep and made rich with well-rotted manure. It is a good practice to pinch out the bud of the main shoot as soon as half a dozen rough leaves are formed, as that causes lateral branches, and makes the fruit set earlier. Light, dry, sandy loam made rich, and a dry, hot atmosphere, if the plants are kept moist, will grow fine melons. We think the Green citron, a small, rough green skin, roundish form, the best sort. The Pine-apple and Jenny Lind are similar, and excellent. The Nutmeg melon grows larger, with rough skin and greenish flesh, aromatic and sweet. Skillman's Fine Netted looks as though the green melon was bagged in a brown net, and is a very fine melon, and ripens early. The Christiana is a yellow-fleshed sort that ripens very early. It is a Massachusetts seedling.

546. **Water-Melons,** though grown in all the Northern States, never come to such perfection of excellence as they do in warmer climates. Here they should be planted in May in light, dry ground, and they often do best upon almost pure beds of sand, having hills prepared by digging out large holes and filling them with manure, and covering it with soil. If the plants are watered with a solution of two pounds of Peruvian guano in a barrel of water, their vigor will be much increased. It is a great object to get them forward as fast as possible. A very successful grower of water-melons upon the granitic soil of Westchester County, N. Y., says:

"I dig a hole three feet wide and three feet deep or more, and fill it with cow-yard manure early in the season—say 1st of May, and cover this with light soil, six or eight inches deep, before planting the seeds. For musk-melons I manure with well-decomposed manure, sown broadcast and worked into the soil. I would also work in a little of this fine manure in the top of the water-melon hills."

The vines fruit better if the leading shoots are frequently pinched back. Water-melon hills should be ten feet apart in rich, sandy loam or artificially enriched sand. Six or eight seeds to a hill, not over an inch deep, in fine, black soil, over any amount of rich manure, will produce vigorous vines. The varieties of water-melons are almost innumerable. The Mountain Sweet and Black Spanish are our favorites. Cut-worms and bugs are the greatest pests of all vines, and the best of the many remedies in our opinion is the cheapest, which is simply inclosing the hill as soon as planted with a board box six or eight inches high, drawing the earth up a little around the outside. It has been found unnecessary to cover the top with thin muslin or flakes of cotton batting, except for the purpose of keeping the earth warmer. These boxes should be made about a foot square, and tapering enough to admit packing them in nests to stow away as soon as the plants are large enough to allow of removing their wooden walled protection. Other seeds may be protected by such boxes against scratching hens, as they will seldom, if ever, get inside to do mischief; and so long as hens do not destroy seeds or plants, or fruit in a garden, they are useful, for they eat up thousands of worms and bugs.

Other melons should be planted and treated as we have said of watermelons; and of all the various sorts of musk-melons, the small green melon that looks as though covered with a fine flaxen netting is the best, to our taste, though we have great hopes that the new Persian melon, that grows as big as the old musk-melon, will prove as rich as its first fruits indicate.

Great care is necessary to save melon seed pure. Vines of cucumbers and melons never should grow near to each other. Let the truth be remembered, that the varieties of all this family will mix, and that seedlings seldom improve either sort, and that the best always suffer by the contact.

Bees are great mixers of the pollen of flowers, and they can only be prevented by getting up earlier in the morning than the bees. Select a number of female blossoms which have opened during the night. They may be known by growing on the end of the young squash, melon, etc., while the male blossoms ("false blows," as they are often called) have no fruit. Scatter the pollen of the male blossoms upon the stamens of the female ones, and carefully cover the latter with millinet, or anything which will protect them from the visits of the bees. A piece of cotton cloth, or even a squash leaf, kept in place by a few clods of earth, will answer a good purpose. When the blossom withers, the covering may be removed, and the fruit marked by a colored string tied loosely around the vine.

547. **Melons Started in the House.**—It is recommended by one who has met with success, to fill some small open baskets with earth and start the plants in them by artificial heat. Suitable baskets to hold a pint may be made for half a cent each of bark or willow twigs, or split stuff, or even shavings, or old, worthless strawberry baskets may be used. Perhaps straw baskets would answer, and be very cheaply made. Anything that will hold the dirt until the plants are large enough to set out, will answer the purpose, and then the baskets and all the contents are planted in the hills. The object in using baskets is not to disturb the roots of the plants, as they are very tender, and do not bear transplanting. Any other tender plant may be grown in the same way.

548. **The Apple-Pie Melon.**—L. Norris, of Windsor, Ashtabula County, O., says: "The apple-pie melon, with good cultivation, will attain to 40 or

50 lbs. each, and if gathered carefully when ripe, and kept in a dry, cool place, will keep sound a year, and will always prove a good substitute for fruit for pies or sweetmeats. To use, peel off the skin, take out the pulp, cut fine, and stew three or four hours, when the substance will resemble stewed green apples; to which add sugar and lemon-juice, and it will make pies that can not easily be told from those of apples."

Another cultivator says: "This melon attains a large size; I have grown specimens the past season, eighteen inches in length, weighing from 30 to 40 lbs. They are cylindrical in form; color, when ripe, a golden tint, very solid, and flesh close-grained; color of seeds, a dark green or blue; ripens in September, and will keep sound and good, it is said, for two years, but we have not as yet tested their keeping qualities. They prove hardy and of easy culture, and I consider this melon a valuable acquisition. We have tested the quality of them for pies, and find them very delicious. To prepare one for cooking, peel and cut up the melon small, taking out the seeds and soft pulp. Put the pieces in a preserving kettle with just enough water to keep them from burning, and stew over a tolerably brisk fire for three or four hours, or until the whole is reduced to a soft, pulpy mass, free from lumps, and thoroughly done. You have then a substance resembling green apples stewed, and by adding a little sugar and lemon-juice to it, and making it with crust in the usual way, it is impossible to tell it from a fresh apple-pie. If you desire a pie like pumpkin or custard of the melons, stew as above directed, but omit the lemons, and bring the pulpy mass to the proper richness and consistency by the addition of sugar, milk, and eggs. Little of either of these ingredients will be found necessary—only sufficient to give the melon color and flavor."

549. **Squashes—Summer and Winter Varieties.**—The varieties of squashes are so numerous, that almost every neighborhood has some favorite. The most universal one is the Boston Marrow, and next the Hubbard squash; the last the best, but being a newer variety, has only become generally known within a few years. They are both medium-sized, and are extremely rich food for winter use, simply boiled and eaten as a table vegetable, as a substitute for sweet potatoes, or for pies and other cookeries. The form of the first is ovate, pointed, with thin, salmon-colored rind, and flesh of deep orange color and fine-grained; keeping all winter. Average weight, six to eight pounds. The Hubbard is a better substitute for sweet potatoes than the other. It has a hard shell, and is an excellent kind to keep through the winter. It grows about the same size as the Marrow, and is immensely prolific. The Lima Cocoanut is a variety much esteemed by some as a winter squash; it grows large, oblong, of a bluish color, very fine-grained, and sweet. The Honolulu, a new variety, is said to excel all others in productiveness, fine flavor, and good keeping qualities. A large, almost white squash, which we have grown several years, we like full as well as either of the above for pies, and it is more hardy, and sure to produce a good crop in all situations. The flesh is sweet and rich, but not as fine-

grained as the others, but it grows three or four times larger, with a smooth, polished skin, the color of white wax. In size of fruit and vines, it is more like pumpkins than ordinary squashes. Among all new varieties, we should not forget the old Crookneck. It is a squash of good eating and keeping quality, and not so delicate in its growth as some others. There is also a crook-necked summer squash, which is considered by those who have grown it, the largest, the very best of all the summer varieties. It is early, productive, and one of the kind called bush, or non-running sorts. Its color is yellow, and has a warty skin, and hard shell when ripe. The Early White, scolloped, a bush variety, we have grown with satisfaction as to its eating qualities, though we thought it a shy bearer. The hills for squashes should be highly manured with well-rotted stable manure or compost, but not with anything very putrescent, which will give off ammonia and kill the young plants, which are very tender. The seeds must not be planted while there is any danger of frost, as a very slight degree of cold will kill the vines while new. The use of salt in manure must be avoided with all the *cucurbita* family, but plaster may be used to great advantage both as a fertilizer and bug preventive.

550. **Egg-Plants.**—These garden plants are not as much grown in Northern gardens as in Southern ones, because they can rarely be brought forward early enough in the spring without the aid of artificial heat, as the young plants are very tender. If you have no hot-bed, sow the seed as early as possible in a sheltered, warm, dry situation, and protect the young plants with hand-glasses or boxes, or some covering in cold nights, until they are three or four inches high; and when the weather has become steadily warm, transplant them into very rich, mellow soil, setting the plants two and a half feet apart. A fourth ounce of seed will produce more plants than any family wants. The earliest variety is called Long Purple, and grows a plum-colored fruit of several pounds' weight, which those who are accustomed to eating it, call delicious. There is a sort, called Large Oval Purple, that grows larger than the above, and is perhaps preferable for general culture. The early and late sorts may be distinguished while growing by the stems. The earliest grows smooth and the others prickly. There are two sorts grown for garden ornament—one red and the other white—of much smaller size than the sorts generally grown for cooking.

551. **Salad-Plants—Lettuce.**—Lettuce is the principal salad-plant cultivated among farmers, and so far as our observation extends, the poorest varieties are most in use, and rarely made to produce semi-solid heads, such as we often see in the city market, almost large enough to be mistaken for cabbages. The best sort for early spring use, sown in open ground, or for hot-bed forcing, is the Early Curled Silesia, because it makes a strong growth of yellowish-green tender leaves, which are very good eating as soon as they are large enough to pick, and will afterwards form loose heads. Do not pull up the young roots, but pick off the leaves, or clip them from the roots with a pair of scissors, and others will soon grow. The Early Tennis Ball is

esteemed one of the best varieties which form heads. Recollect that some sorts of lettuce will not head, with all your care, but the leaves may be made more tender by tying them up, so that they will grow blanched. One of the best sorts of non-heading lettuce is the Ice Cos, the leaves of which are brittle, growing long, narrow, and dark-green, and of somewhat an icy appearance.

There are also four other sorts of Cos lettuce—the Paris Green, Paris White, Florence or Golden, and Spotted Cos—each of which you will be told is best by the person who grows it, and no other. The hardiest sort is the Brown Dutch, which may be started in autumn, and slightly protected so as to endure winter, and grow early in spring. It will form a loose head, but is not generally grown for heads, but for the early young leaves; the other sorts being preferable to it for heading. One of the largest varieties is called Large India; it is less curled than the Silesia, and the leaves are whiter, slightly edged with pink. This kind endures the summer heats well, and forms large, round heads, which cut solid and crisp. There are several other sorts, but what we have said of these is enough to show that there is a great variety in this family of garden plants.

To grow good lettuce, the utmost care must be used in preparing the ground. The soil should be made as fine as the seed, and as rich as good garden mold can be. The seed should be sown every fortnight from February to June, to get a succession of young plants. The ground must be kept loose between the rows, and it pays well to water with guano in a weak solution.

An ounce of lettuce seed will grow plants enough for half a dozen families. It would require a bed about ten by twelve feet to sow an ounce of seed, and it would produce some 5,000 plants.

552. **Mustard** is often grown for salad, the white or yellow seed variety being very good for that purpose. It should be sown in the fall, or it may be started in spring, in a hot-bed or warm southern exposure, in rows six inches apart, and no matter how thick in the rows, as it is to be cut when two inches high. The black seed kind is often sown for greens, as well as to grow seed for use or sale. It ripens seed in July or August.

553. **Nasturtium.**—This is another salad plant, when very young, though generally grown for its fruit, which is used for pickling. The pods are gathered before they ripen for this purpose, and some use the flower-buds, esteeming them as good as capers. The orange-colored flowers are also used for garnishing dishes. For salad, sow the dwarf variety early in spring, in drills an inch deep, along borders of beds, so that what is not cut for salad may grow for ornament.

554. **Garden-Cress.**—This is a favorite salad plant, and in this character only the seminal plants are used. It is very hardy and prolific, and may be sowed once a week, from the opening of the ground in spring until the close of the season. Old rich garden soil is the most congenial to it, but

any lands of fine texture will, if properly pulverized and enriched with putrescent manure, produce a good crop.

Do not mistake this for the plant more known as peppergrass than it is as cress. The article we allude to grows annually from seed or from roots, forming compact bunches of twenty or thirty stalks, which grow a foot high, and bear smooth succulent leaves and an upright stem full of seed-pods, something like turnip. It is very apt to seed itself, and may become troublesome if care is not taken with it. It is so hardy that it keeps partially green all winter, under a very slight covering, and its greatest value is, that it affords something green very early in spring.

555. **Water-Cress** (*Sisymbrium nasturtium*) can be easily grown from seeds or roots, wherever there is a stream or spring in the ground near the house. It grows best in situations where the roots are always in water, and in winter the whole plant is overflowed, and it particularly delights in pure water, clear and cold, such as runs in the little spring-brooks. If you happen to have one that does not freeze, you may have water-cress at any time during winter. It is started by sowing the seeds or setting the plants in a suitable spot for its growth. After it once gets fixed as a habitant of any place, it requires no care in its cultivation.

556. **Endive,** a plant of the chiccory species, is often cultivated for a winter salad, though more used in stews and for garnishing tables. The Green Curled is the hardiest sort, growing beautifully curled leaves, dark-green, which are tender and crisp when young, and much esteemed as salad by some persons, and are considered wholesome. The French use the Batavian Endive in stews and soups. It is a broad-leaf sort, which grows not much curled. This, when very young, is eaten as salad, but is not as good as either the Green or White Curled. The seed is sown late in the spring, or even middle of summer, for fall use, and the leaves are blanched for use by tying the outer leaves over the inner ones. An ounce of seed will sow a bed eight by ten feet.

557. **Turnip-Sprouts,** grown under a straw mulch, are blanched and tender, and make a delicate, sweet salad, and may be had early in the spring with a little care.

558. **Okra.**—Under the head of "History of Some Common Garden Vegetables" we have told the uses of this plant. Its consumption has increased so much in New York since its introduction a few years since, that one market gardener of our acquaintance grew seven acres of it last year (1860), part of the crop selling green and part dried. There is no plant grown in the garden that affords cheaper food than okra. The pods, in soup, make it mucilaginous and nutritious. There is a dwarf okra plant which does not grow more than two or three feet high, and is very prolific of branches and pods, that for this latitude will be a valuable improvement over the large kind, which grows five or six feet long. Ripe okra seeds are sometimes used as a substitute for coffee. It is doubtful whether they are as good as the seeds of asparagus.

Okra seed should not be planted till the ground has become warm in spring, and may then be treated much like Indian-corn in all its cultivation, and grows well in soil suitable for corn.

559. **Tomatoes.**—The rapidity with which this vegetable has been brought into almost universal use is well-nigh beyond belief. It is quite within the memory of middle-aged people that it was grown only because its fruit was ornamental, and by many supposed to be poisonous. Its common name in New England was "Love Apple," though no one loved it. Now there are not many families that do not esteem tomatoes as much as any garden vegetable, and gardeners are constantly making efforts to produce new varieties of improved quality. Let no one suppose he has got the best sort until he has tried several others. There is more difference in the quality and value for food of tomatoes than there is in potatoes. We will name a few of the best. We have grown a very large yellow tomato, which we prefer over all others, because it is less acid, and the meat appears to have more of the food principle in it than any of the red ones, unless it is one called Fejee Island Tomato, which we think identical with one called "Perfected," and said to have been introduced by C. Edwards Lester. It is a very large red sort, and very good eating, and a little finer grained than one called the Large Mammoth Red. The poorest tomato in existence is the one almost universally grown for the New York market. It is of medium size, smooth, roundish, with a tough skin, and sour, hard meat, frequently very hollow, partially filled with seeds and sour water, and being generally gathered in a green state, is no more fit to eat than the vines it grows upon. It is grown because it bears transportation better than the good sorts, and it will sell to people who do not know how to appreciate a good tomato. As a general rule, to select good sorts of tomatoes for cultivation for family use, choose those which grow uneven-shaped rather than smooth, such as you can pull apart without cutting, the lobes separating with a glistening fracture. If you wish to have some ripen earlier than the large sorts, you may choose a round, smooth, medium size, called Early Apple Tomato. For pickles and preserves there is a sort known as pear or fig tomatoes, being about the size and shape of figs. There is a small yellow sort, grown for preserving, and so is the sort which grows about the size of potato-balls, and as round and smooth. A distinct variety, called Winter-Cherries (see 675), grows with a husk about the size of large cherries, and is much liked by some to eat out of hand. Care must be taken to prevent the different sorts of tomatoes from mixing, else, if you have a choice kind, you will be apt to lose it, as the inclination is to run down rather than up the scale of improvement.

The cultivation is very simple. In warm latitudes they are self-propagating. In this latitude, where the family has no hot-bed, the seed should be sown for early use in boxes or pots, in February and March. The seeds sown in boxes, if kept in a warm room, in the light of a window, will grow healthy plants, which, when two inches high, may be pricked out and set single in pots, and carefully nursed till all danger of frost is over, in some warm, sheltered situation, where they can grow out-doors. To hasten the first fruit, pinch off all shoots above the first formed ones as soon as the tomatoes are the size of cherries. Afterwards cut off most of the leaves, to let the sun have its full force upon the fruit; you will thus get a small crop several weeks ahead of the ripening when planted out at the ordinary time and left to the natural course of growth. To have really good tomatoes, fit to be eaten in a raw state, which certainly is the most delicious form in which they can be eaten, you must have a good sort, and grow them on good land, and select the first fruit, and trim the vines so that the sun shines upon it, and let it become fully ripened before it is gathered. It should always be eaten while fresh to get its full value. Then it is both palatable and wholesome.

If the seed be sown in May, in good rich soil, of a warm nature, with a sufficiency of old, well-rotted manure, there will rarely be any danger of failure. When the vines begin to show leaves, they should be provided with a trellis, or tied to stakes fixed in the soil, to keep the fruit from being injured by coming in contact with the dirt.

There is, however, a new sort lately introduced, called "*Tomato de Lays*" in France, and with us, the Upright or Tree-Tomato, that requires no support. Its stem is two feet high or more, and so remarkably strong and stiff, that they are nearly self-supporting—a highly commendable quality. It branches less than the common Great Red Tomato, is less leafy, does not want so much pinching, does not bear so freely, but its fruit is larger and more regularly formed.

Medicinally, the tomato is in high repute. Dr. Bennett, a professor of medicine of good standing, has published the following opinion of its good qualities:

"1. That the tomato is one of the most powerful deobstruents of the *Materia Medica*, and that in all those affections of the liver and other organs, where calomel is indicated, it is probably the most effective and least harmful remedial agent known in the profession.

"2. That a chemical extract will be obtained from it which will altogether supersede the use of calomel in the cure of disease.

"3. That he has successfully treated serious diarrhea with this article alone.

"4. That when used as an article of diet, it is almost a sovereign remedy for dyspepsia or indigestion.

"5. That persons removing from the East or North to the South or West, should by all means make use of it as an aliment, as it would in that event save them from the danger attendant upon those violent bilious attacks to which almost all unacclimated persons are liable.

"6. That the citizens in ordinary should make use of it either raw, cooked, or in the form of a catsup, with their daily food, as it is the most healthy article in the *Materia Alimentaria*."

Prof. Rafinesque, of France, says: "It is everywhere deemed a very healthy vegetable, and an invaluable article of food."

Dunglison says: "It may be looked upon as one of the most wholesome and valuable esculents that belong to the vegetable kingdom."

A writer in the *Farmer's Register* says: "It has been tried by several persons with decided success. They were afflicted with chronic cough, the primary cause of which, in one case, was supposed to be a diseased liver; in another, diseased lungs. It mitigates, and sometimes effectually checks, a fit of coughing."

The method most commonly adopted in preparing this fruit for daily use is to cut them in slices, and serve with salt, pepper, and vinegar, as you do cucumbers.

To stew tomatoes, remove them ripe from the vines, slice up, and put them in a pot over the stove or fire, without water. Stew them slowly, and when done, put in a small piece of good butter, and eat them as you do apple-sauce. Some add a little flour-bread, finely crumbed, or a couple of crackers pulverized, to a quart of the stew.

560. **Radishes.**—Almost every family grows radishes, but every one does not grow them to perfection. The radish appears to have originated from China, where it is still grown to much higher perfection than in any country of its adoption, and is largely used as an article of food throughout the year, one variety being grown especially for winter use. Although not a very nourishing sort of food, it is a very palatable condiment, and very acceptable upon all tables in the spring season. The tops are frequently used when quite new as a salad, and the green seed-pods make nice small pickles. To grow good radishes, your ground must be rich from manuring in previous years, or by guano in solution, or superphosphate, while the plants are growing, and not by fresh putrescent manures. Radishes are only good when the growth is rapid. To have this they must have a good soil and frequent waterings, either naturally or artificially.

For early use, sow on mildly hot beds, or in boxes in-doors, and afterward in sheltered places, and water frequently, thinning out the weakest plants. Put in a few seed every ten days, as long as you want to continue the production, in drills ten inches apart, or with other seeds of slower growth, to mark the rows. An ounce of seed will plant a bed ten feet square. One of the best early sorts is known by the long name of Early Short-topped Long Scarlet. It grows half out of ground, and very crisp. The Olive-shaped radish, lately introduced from France, is an early and favorite sort. It resembles the scarlet turnip radish; is rose-colored, oblong; top quite small, and if grown rapidly, is crisp and sweet. For our use, we prefer turnip radishes to the long sorts. For winter use, the Spanish, or Black radish, or a sort called Rose-colored China, is sown in the fall, and gathered before freezing, and packed in sand in a dry cellar.

561. **Rhubarb, or Pie-Plant.**—This valuable garden vegetable is easily grown, and affords the first thing in spring for pies and tarts. It is best to get roots for a start, as it is not always true to the kind from seed.

Autumn is the best time to make a rhubarb or pie-plant bed, and the roots may be put in at any time when the weather will admit. The great secret of success is to get a deep, rich bed to begin with. It can not be too deep or too rich. We would dig it five feet deep for family use, and fill one foot with cobble-stone, if we could, or with broken brick, timber, and brush, so arranged as to give a good drainage. Then fill up with sods, chip manure, wood's mold, good soil, and well-composted manure in a homogeneous mass, casting away the subsoil. Such a made bed will last as long as its maker will, and if ten feet wide and twenty feet long, set with three rows of roots, two feet apart in the row, it will furnish the largest family with more than they can use, so that some of their indolent neighbors can get a portion. Except when grown for market, we would not select the largest variety of rhubarb. Seedling plants may be cut after the first year to a small extent. It is good to mulch the bed summer and winter. Seed stalks must be kept carefully cut away as fast as they appear, and the bed must be richly manured every fall.

Some of the sorts in highest repute are the Victoria, Linnæus, Royal Albert, Scarlet Nonpareil, and Mammoth. The largest sort is known as Cahoon's Seedling. It is better esteemed for wine-making than eating. Fifteen hundred gallons an acre have been made from this sort, grown upon well-drained, rich, loamy land in Wisconsin. The stalks are cut in lengths of two or three inches, and ground and pressed in a cider-mill, one hundred pounds of stalks yielding ten gallons of juice, which is mixed with an equal quantity of water, and about three and a half pounds of refined sugar to each gallon of the mixture. This, if treated like other small fruit wines, gives a palatable beverage, salable, and very profitable to the grower and manufacturer.

562. **Savory and Medicinal Garden Plants.**—There is a variety of plants which every farmer's family should grow in the garden, which are useful in the kitchen, nursery, or sick chamber, a few of which we will name.

Hoarhound.—This plant (*Marrubium vulgare*) is called hoar on account of the white, downy growth upon the leaves and branches, which resembles hoar frost. The plant is in high repute as a remedy for colds and coughs. It is not a native of America, but was introduced by the first settlers as a valuable medicinal plant, and from the garden it has spread to the roadside and fields in every favorable location, as it propagates readily from the seed.

A good many other medicinal plants were introduced in the same way as hoarhound by the New England pilgrims. Among them we may name *lavender*, from which spirits of lavender and oil of spike are made, although another plant (*L. spica*) gives the name. *Comfry* is another of the old-time medicines that our ancestors made use of in cases of inflamed throat and intestines, and for emollient poultices and salves.

Peppermint and *Spearmint* are pretty well known and generally esteemed. One, if not both, come from Europe, and have been largely cultivated in this country for the oil which, when diluted, or "cut" with alcohol, forming essence of peppermint, is esteemed as a remedy for flatulence. Until the distillers of peppermint took to cheating by mixing oil of turpentine with their product, which spoiled the trade, the growing of peppermint was a good business in some of the New England States ; but since it has been so much injured by fraud, it is not worth while for farmers to engage in its field culture at the present price of the oil, though it should be grown in gardens for family use.

As a crop, this plant can be grown upon any moist, rich soil; that which will produce good corn will grow peppermint. The land should be plowed deep, and it will be found advantageous to use the subsoil lifter, and the crop must be cultivated while the plants are small to keep the weeds down, and therefore should be planted in rows eighteen inches apart. Spring is the best time to set out a new plantation by offshoots or subdivision of old roots. The yield will be small the first year, and upon some land, after two or three years, it gets so full of grass as to render it necessary to turn the whole sod over and let the mint grow up again, which it will do, and the process of turning under enriches the land. The mint is cut for distillation when in blossom, and we think yields from fifteen to twenty pounds of oil per acre.

Wormwood is another imported plant, and is a very hardy perennial. Its leaves, bruised and wet with vinegar, are esteemed a valuable application to sprains and bruises, and its bitter properties used to be esteemed as a tonic.

Balm, *Saffron*, *Hyssop*, *Lavender*, *Fennel*, *Bene*, and *Rosemary* are all useful medicinal herbs to cultivate in gardens, and the following are grown for various uses in cookery: *Anise*, *Sweet Basil*, *Carraway*, *Coriander*, *Dill*, *Fennel*, *Sweet Marjoram*, *Summer Savory*, *Thyme*, and *Sage*. The last is considered almost a necessity in some families, and is grown upon perennial roots. It is better, we think, to plant seed every year, and not keep the roots over two years. All of the above-named herbs are grown by gardeners near cities to sell in market.

Parsley is another agreeable, savory herb, much used as a garnish of meats on the table and seasoning of soups. It is easily grown in good garden mold. It is sometimes planted as a fringe for beds or walks in the garden. It is grown in some places for the roots, which are like small carrots, to feed to cattle. An ounce of seed is enough for a row two hundred feet long.

Peppers should always be grown in sufficient quantity for seasoning all soups and stews, as such is far healthier than pepper that we import.

The Long Cayenne is a very pungent sort, and grows up dwarf-stalks. The Cherry pepper is also a good dwarf sort. For pods to pickle green, grow the squash pepper, which has a tomato-shaped pod, rather mild, and very productive. The Sweet Mountain grows in a similar form, but much larger. The Sweet Spanish is the mildest of all for pickling or to eat green as a salad.

Peppers should be sown early in light, warm soil in a seed-bed, and transplanted and manured with guano water or hen-dung in solution.

563. **Jerusalem Artichokes.**—This plant, the *Helianthus tuberosus*, should have a small corner in every garden, or somewhere convenient about the farmery, as it affords very agreeable food early in the spring, when something is longed for fresh from the earth. It is one of the best antiscorbutics known. It also affords a great crop of good pig feed. One man in Ohio estimates the yield at the rate of 1,700 bushels an acre. We recommend this plant as altogether preferable for cultivation over the Chinese yam, *Dioscorea batatas*, about which so much has been written and said. All that is necessary to be known about that plant we give in the next paragraph.

564. **The Chinese Yam.**—This new esculent has certainly been tested long enough in this country to determine its true value for cultivation. That it is palatable and nutritious, when properly cooked, no one doubts. That it would ever be adopted as a substitute for the common potato (*Solanum tuberosum*), or of the sweet potato (*Convolvulus batatas*), among those who grow those roots as a sale crop, we have never believed, but have hoped that it might prove a valuable addition to our family of food-producing plants; but as yet we have not the evidence that this will be the case.

The *London Gardeners' Chronicle* of September, 1858, says of the Chinese yam (*Dioscorea batatas*) that—

"Many excellent results were obtained last year in various parts of the country, and gardeners begin to understand the nature of this strange production, which, although provided for the food of man, naturally grows in the ground in such a way as to make it impossible for him to pull it up. It is now, too, agreed that the quality of the root, when properly cooked, is excellent.

"When first introduced to Europe by the French, this esculent was regarded as a mere curiosity, and maltreated accordingly; but eventually such information concerning it was obtained from M. de Montiguy, French consul at Shanghae, as led to its receiving the attention due to a root which might some day be found good to eat.

"The herbage of the Chinese yam is singularly like that of *Tamus communis*, the common black bryony of this country, consisting of long, weak, angular, wiry, annual stems, covered with heart-shaped shining leaves. It ordinarily begins to push its roots as soon as the ground temperature rises to about 50 degrees, which, near London, corresponds with the beginning of May. Shortly afterward the shoots appear and soon spread over the surface, not, however, with much vigor at first, nor, indeed, till the month of August. The plant is evidently occupied for some weeks in making these true roots and preparing for the singular development of that false root, which is the yam itself—the part to be eaten. When the roots and stems have attained the necessary vigor, which seems to be when the ground has become heated up to 60 degrees, or thereabouts, in August, there appears among the roots a soft, fleshy horn, which directs itself perpendicularly downward, and growing with considerable rapidity, soon becomes a club-shaped body, the small end of which is near the surface of the ground. This manner of growth is exactly like that of the arrow-root plant (*Maranta arundinacea*), and continues until the end of October, when the yam is completed, and under proper treatment will have attained the length of from 15 to 24 inches, weighing about one pound. In France, specimens have been dug up weighing two and a half pounds, and measuring a yard in length. In its perfect state it resembles a very long trumpet gourd or a large parsnep, with the crown downward. The tail, which forms one third of the length, is cut off and divided into inch lengths for propagation; the thicker part is eaten. In the course of its downward growth, the power of development is so great that the thick end will force its way into hard clay, and even bury stones or fragments of pottery in its substance if its progress is sufficiently opposed. All obstacles ought to be carefully removed.

The best results in the cultivation of this yam have been obtained where the temperature was highest, and the first object of the gardener should be to obtain all the heat the sun can give him in soil three feet deep.

The plant should be grown in ridges, made to run east and west, and rise eighteen inches above the level, in earth trenched three feet deep. The yam will not be worth growing in poor or worn-out land, nor among stones.

There is no doubt of one beneficial result from the attempt to cultivate this root, if the above directions are complied with. If it does not produce a profitable crop of yams, it will fit the ground most admirably for any other crop; and any man who has ever planted, grown, and gathered them, and afterward planted any other crop upon the same ground, must be convinced of the advantage of deep cultivation, since the yams can not be extracted without digging two or three feet deep, which, even without manure, is a most excellent preparation for beets, carrots, parsneps, or anything else ever grown upon the farm, orchards included.

565. **Sweet Potatoes.**—The first step in the cultivation of sweet potatoes is to know how to sprout them, as they are grown from sets, not from tubers planted in the hill. J. W. Tenbrook, of Rockville, Ind., published the following directions, which we copy and approve.

"Arrangements should be made early in the winter to have frames and covers made and seed potatoes, manure, and all necessary material for the hot-beds ready in due time.

"The potatoes should be kept in a warm, dry room, until they are placed in the hot-bed, which must be warm, as they will not bear a lower temperature than 40 degrees without injury.

"The location of the beds should be near a street or public road, on dry ground, with a southern inclination, and convenient to pond or branch water.

"The best material for a hot bed is fresh horse-stable manure that has not been rotted; and if mixed with one fourth to one half its bulk of either sawdust, fresh leaves, tan-bark, or straw, the heat would be more mild and durable, and less liable to scald the potatoes.

"About the first or second week of April, in this latitude, haul the materials for the bed, and mix them together in a ridge where the bed is to be made, and as soon as it is hot, shake it thoroughly, mixing the cold and hot, wet and dry portions together, forming a bed on the top of the ground, running east and west, which, when settled with the fork—not trampled—should be fourteen inches high, more or less, as there is a greater or less proportion of manure used, and six inches wider on all sides than the frame to be placed over it.

"Hot-bed frames should be made of two-inch oak plank, framed together at the ends with keys, so as to be easily taken apart and stored when not in use. They should not be over twenty feet in length, nor exceed four in width. The front, or south side, should be eight inches high; the north, from eight to twenty, according to the slope of the ground on which the bed stands, as the top of the frame should have a pitch of eight to twelve inches to receive the heat of the sun, and to shed off the rain freely. Temporary beds are made by setting slabs or plank on edge, and filling in the manure; but such beds are difficult to cover, and if used, the potatoes should not be laid within six inches of the sides. [See 598.]

"Cover the beds five inches deep with the mellow earth, on which set the frames and proceed to lay the potatoes two inches apart, with the top end of the potato toward the planks, and inure them to the open air. Glass-covered hot-beds cause the plants to spring up tender and weak, and such plants do not grow, when set out in the hill, like those raised in open beds.

"The best covers are made of strong oiled muslin, tacked on lath, so that they can be rolled up conveniently. These covers will admit the light, shed off the rain, and be cheaper in the end than other covering, and sufficiently warm except in extremely cold weather, when straw or some warm covering should be thrown over them. Trampled straw, or mats made of rye straw, answer in the absence of better covering.

"The beds should be watered in the evening with a suitable watering-pot, to keep the earth in a good growing condition. If spring or well water is used, it should stand in the sun or be warmed before using. After the plants are up, they should, if the weather is warm, be kept tolerably moist, to encourage the growth of good strong roots, and light warm showers would be better than watering, but cold and heavy rains must be guarded against, as they would soak into the beds and ruin them.

"Ditches should be formed around the beds, and the earth thrown up to keep the water from running under and chilling them.

"When the plants are three inches high, and well rooted, they are ready to pull, which is performed by taking hold of the plants with the thumb and forefinger of one hand, while the potato is held firmly in its place with the other. Careless drawing, by inexperienced persons, frequently destroys half the profits of their beds.

"When plants are to be sent a distance, they should be set in shallow boxes, with their roots in wet earth or moss, but they must not be packed in wet weather, nor have their leaves wet, or they will rot immediately. Plants may be taken off the beds and preserved in a cave or cellar for a week or more, with their roots packed in damp moss or earth, if not packed too close.

"If by bedding too early, or crowding, the plants should grow long and slender, they may be cut down to two or three inches in length; but this should be avoided by giving plenty of room and air, and by working the earth in among the roots with the fingers as it is lifted up by the plants, and settling it by watering."

The best ground to grow a crop of sweet potatoes upon is sand, enriched with very well-rotted manure, leaf-mold, fine compost, guano, or superphosphate. The hills are rounded up like mounds, a foot or more high. All who live upon sandy land, south of latitude 41 degrees, can grow a few sweet potatoes in the garden, if not as a field crop. They are best preserved by packing in cut straw, in barrels, set in a stove-heated room, where the thermometer never will sink below 40 degrees, and rarely rise above 60 degrees. See 438.

566. **Hot Water for Seeds.**—There are many seeds which may be greatly quickened in their vegetating powers by the use of hot water. Onion-seed, for instance, may be made to sprout upon the instant by pouring boiling water upon it. You need not fear killing it. Put some in a saucer, and pour on water from a tea-kettle, and after a half minute pour it off again, and you may see the sprouts shooting out the next minute; and if then planted, while hot and moist, in pulverulent earth, closely packed upon them, you will get them forward two or three weeks earlier. The same effect will be produced upon all black, hard-shelled seed, such as onion, asparagus, sunflower, water-melon, apple, and many others. Locust-seed should be thoroughly scalded in boiling-hot lye, or several repetitions of hot water.

567. **Cranberries in the Garden.**—Cranberries have been so long looked upon as wild plants of swamps, that it is difficult for people to realize that they can be grown in gardens as well as strawberries, which are naturally a wild field growth.

Cranberries do naturally grow in swamps, but they may be made to grow artificially in good loamy garden soil, or that which is naturally a little mucky, such as is the most suitable for potatoes, if deeply worked. The best soil, however, for cranberries, is almost pure sand, with water naturally standing, or percolating through it, within less than two feet of the surface. A bed occupying one rod and two fifths, in the garden of Charles B. Phelps, Colebrook, Conn., planted in June, 1857, yielded three bushels in 1860. The vines were taken from a natural bed, and set in small tufts, one foot apart in the rows, which were two feet apart, and these were kept clear of weeds until the whole ground became matted with vines. The bed then will continue longer in bearing than any bed of strawberries, without enriching the soil.

The cranberry is a semi-aquatic slender evergreen, content to occupy that part of a farm which is too low and too wet to be used for any other purpose, and is satisfied to feed on water, and the slightly alluvial deposits afforded by the adjacent highlands, and does not, like some overgrown annual plants, make heavy drafts upon the soil.

For field culture of cranberries, all that we have said here will be almost equally applicable, but the subject is treated more at large in No. 700.

568. **Number of Trees, Plants, or Rows to an Acre.**—The following tables will aid any one in determining how many trees or plants he can grow upon one acre, which contains 43,560 superficial feet:

No. of feet apart.	No. of Plants.	No. of feet apart.	No. of Plants.
1	43,560	9	537
1½	19,360	12	362
2	10,890	15	193
2½	6,869	18	134
3	4,840	21	98
4	2,722	24	75
5	1,742	27	59
6	1,210	30	48

The following table shows the number of rows, of different widths, in a square acre, and number of plants an acre contains:

No. of feet apart.	No. of rows.	Plants in a row. 12 in. apart.	15 in. apart.	18 in. apart.	24 in. apart.
2	105	22,050	17,640	14,700	11,025
2½	85	17,850	14,280	11.900	8.925
3	70	14,700	11,760	9,800	7,350
3½	60	12,600	10,080	8,400	6,300
4	52	10,920	8,736	7,280	5,460
4½	46	9.660	7,728	6,440	4,830
5	42	8.820	7,056	5,880	4,410
5½	38	7.980	6,384	5,320	3,990
6	35	7.350	5,880	4,900	3,675
7	30	6,300	5,040	4,200	3,150
8	26	5,460	4,368	3,640	2,730
9	23	4,830	3,864	3,220	2.415
10	21	4,410	3,528	2,940	2,205

It is a common practice to measure an acre thirteen rods each way; that gives an excess of nine rods. At the South, it is common to measure seventy yards each way for an acre, which is an excess of 540 yards. In calculating the number of plants per acre, set four feet apart—for instance, cabbages—it is common to say ten thousand per acre. This allows nearly nine hundred missing plants. In garden work these rules will always be useful.

SECTION XXXI.—THE FLOWER-GARDEN—VARIETIES AND CULTIVATION OF FLOWERS.

FIRST, let us talk a little about the moral influence of flower culture. We are just as well satisfied of the beneficial moral effects of flower cultivation, as we are that the effects of their beauty upon the senses of nearly all beholders is pleasing. A mother who loves flowers is apt to infuse the same feeling into her children. A love of flowers is a love of the beautiful; a love of the beautiful is a love of the good; and so step by step the child walks in the pleasant paths of love, till its mind becomes thoroughly imbued with all the sentiments of moral goodness. There is no spot on the farm that grows such a "paying crop" as the little parterre near the dwelling, devoted to the cultivation of flowers. If it does not pay in golden coin, it does in all that makes life worth staying here for. What golden hours of joy are spent by the family in the flower-garden! What blessed influences such hours have upon the character of children! If you doubt the moral influence of flowers, look about you, and study the character of those who cultivate them in contrast with those who do not. We have long since settled the question of the beneficial influences of flowers upon all families, and therefore devote a little space to give, upon this subject, some very useful information.

569. **Suitable Soil for a Flower-Garden.**—Upon the subject of soil, we copy from the catalogue of Benjamin K. Bliss, of Springfield, Mass., one of the most successful cultivators and sellers of flower-seeds in the United States, the following sensible observations:

"The soil best adapted to flowering-plants generally is a light friable loam, containing a moderate amount of vegetable matter, and sufficient sand to render it porous; but as it rarely happens that the amateur has much choice of soil, it is fortunate that most of them will succeed in any but such as is of an extremely dry, sandy, or calcareous nature, or of a stiff, heavy, retentive character. In the former, the plants are sure to be starved, and in the latter, if they ever fairly take root, there is generally an undue development of the foliage at the expense of the flowers. In soils of this description much may be done by thoroughly breaking up the superficial crust, or, as it is technically termed, 'trenching' it at least one spade deep, digging in sharp sand or road-scrapings, and if the operation be performed in autumn, so that the loosened soil is thoroughly exposed during the winter to the disintegrating influences of frost and other atmospheric agencies, the advantage will be greatly increased.

Grown By A Farmer's Wife.

PLATE XV.

(Page 500.)

This picture is placed here for the same purpose as No. XIV. in its place. That to indicate the vegetable garden—this to mark the entrance among the flowers. What woman looking upon this lovely vase will not feel a desire to be a producer of such beautiful things? Feeling that desire, she will be inclined to read what the author says of "The Flower Garden." Reading of flowers, she will never be content until she possesses them. And they will mark her elevation to a higher order of civilization as distinctly as this plate marks the entrance to the portion of this book devoted to a good purpose. It is for this that the picture was designed—to entice her to enter upon a path that leads to pleasant groves, to peace and happiness.

"In soil of an opposite character, *i. e.*, sandy or calcareous, the remedy will obviously consist in the addition of loam, in conjunction with decayed leaves or old rotten manure; or where expense is no object, the surface may be entirely removed to the depth of eight or ten inches, and its place supplied with the best loamy compost at hand. The use of strong crude manure of an animal nature should be avoided. In ordinarily good soil an annual light dressing of leaf-mold, decayed turf, or thoroughly rotten manure, in quantities proportioned to the requirements of the soil, dug to the depth of a few inches, will be all that is requisite. These should be applied in spring, only just previous to sowing the seeds, or much of the benefit resulting from their application will be lost, though a single digging may be advantageously given in autumn. In preparing the beds, care must be taken that they are so arranged that the ground may be a little elevated in the middle, that the water may run off and the plants show to a better advantage.

"It is particularly requisite that seeds should not be sown too deep, whence arises most of the failures of inexperienced gardeners. The depth at which seeds are sown will vary with their size; large seeds, such as those of the Lupins, Sweet Pea, or Marvel of Peru, may be three quarters of an inch deep; other varieties from an eighth to a half-inch deep, according to the size or nature of the seed. Some that are very small require to be sown on the actual surface, a slight pressure being then sufficient to imbed them to a proper depth. For the majority of the seeds a very thin covering suffices; if sowed too deep, they are longer in germinating, and the small ones are liable to decay. It sometimes insures a more even distribution of very small seeds, such as those of Campanula, Digitalis, etc., if they are intimately mixed before sowing with a little fine, dry soil, the mixture being sown in the same way as the seeds. Woolly seeds, which adhere to each other, like the Globe Amaranthus, etc., should be rubbed with a little fine sand, which will generally separate them. In all cases, the more thinly the seeds are strewn the better; when too thickly sown, the seedlings become elongated and sickly, an evil which no subsequent thinning out will entirely remedy.

"If the soil be dry and the weather sunny, it will be necessary to water the seeds slightly from a very fine rose watering-pot. Rain-water is preferable. In the absence of rain, this application must be repeated every day or two, for it is important to observe that, when once the seeds have begun to swell, they are peculiarly susceptible to injury from drouth, and will speedily perish unless the soil be maintained in a moist condition; to a neglect of this important precaution, many failures are solely attributable. On the other hand, an excess of moisture previous to germination will often cause the seed to decay, especially in cold seasons; early in the spring, therefore, the water-pot must be used with judgment, and never late in the day, when frosts threaten."

We have found the practice of warming water in the sun or by fire-heat very much preferable to the use of cold water. As it requires the very finest preparation of soil, we recommend all who sow the most delicate flower-seeds to sift the earth through a sieve fine enough for corn-meal.

570. **How to Make a Flower-Bed.**—The following extract, from a paper read before the Farmers' Club, tells how the author made a flower-bed upon a very hard, rough spot.

"I do not expect to tell a professed gardener, nor an amateur who already knows how, anything new; but I wish to tell some who do not know, how to make a flower-bed. At least I will tell how I make one, and leave it to others to follow suit or not, just as they can afford. I received, May 10th, a package of choice flower-seeds, and a dozen bulbs of Gladiolus. As the old flower-beds had already been appropriated, new ones must be made; and as there is always a right place relative to the house and other things, the right place in the present instance fell in a very bad place—on a spot of sod just beneath the window that gives light to my writing-desk and book-case. Here I marked out the forms of my beds in shapes to suit the ground, and not like any diagram laid down in the books. I first took out a spading, as deep as I could drive the spading-fork, breaking up the turf and the remains of a mortar-bed left last autumn by the masons. This first spading and the loose earth left I threw one side, and the next spade-deep the other side. Then I took out another spade-deep and carted it away, and all the stones, and that not a few, and then broke up another course still deeper, and then threw back the second spading, and then the first, forking it all over loose and mellow. Next I put in a heavy charge of rich manure, and over that garden-mold and leaf-mold, mixing all up and raking fine. Next I put a coat of sand, and then rich garden-mold, old rotted sods, and leaf-mold, mixed and sifted. Now the bed was ready for the seeds, and after being marked off to suit the fancy of her who does the planting, they were covered by sifting earth over them, and watered. It is true this was a laborious job, but once done, it is done forever. Here is a bed of earth, rich and mellow as an ash-heap, more than thirty inches deep, with a subsoil of coarse sand, gravel, and decayed granite rock, that gives good drainage. It will require only an annual dressing of compost, and a light forking and raking, to keep it in order to produce the most lovely ornament that ever added beauty to a farm-house—a beautiful bed of flowers. Early this spring—almost as soon as the snow was away—there came, first the little crocuses, and these were followed by the hyacinths, and tulips, and dielytra spectabilis—beauty upon beauty, enough to pay richly for all the labor of making a flower-bed.

"What man with a head a whit better than a pumpkin or a cabbage-head would devote his whole soul to food vegetables, and refuse his family the gratification and cheap happiness of a flower-bed?

"What woman with a soul above soft-soap and scrubbing-brushes, that would live in a country home and not insist upon 'woman's right' to have a flower-bed—ah! to have her house surrounded with flowers, blooming from spring till snow comes again?"

571. **Cultivation of Hardy Annuals.**—Hardy annuals are those plants that flower and ripen their fruits and perish in one season, but many of them may be sown in autumn to flower early the next year. Hardy annuals grow without artificial heat, and come to perfection in the open grounds; but what are known as half hardy plants need pushing a little, except in very favorable localities. Tender and small seeded varieties sometimes fail, not on account of the bad growing properties of the seeds, but solely from bad management. Delicate seeds, like the Calceolaria, or Chinese primrose, must not be sown in the open ground. One party complained that some fine seeds failed to grow which were sown from one to two inches deep—literally buried. The most inexperienced in gardening matters can sow sweet peas, but it requires a practiced hand to look after such delicate seeds as Calceolaria, Cineraria, Fuchsia, and such like.

Many persons think that when they make a hole in the soil with a trowel, and throw in such small seed as Mignonette, that it should be sure to grow; and if it does not, they lay the blame upon the seed, when in nine cases out of ten the fault is in sowing too deep. The proper depth for planting flower seeds is but little more than their diameter, though Lupine and Sweet Peas may be planted one inch deep; but such small seeds as Portulaca and Mignonette require to be sown almost upon the surface of the soil. Some seed are difficult to germinate. Cypress seed require to be soaked in warm water about one hour. The seeds of the Globe Amaranthus are covered with a thick woolly substance, which greatly retards germination, and if planted without soaking, few, if any, will come up. The most convenient method of sowing annuals is to take a round-pointed stick, with which draw a circle six or eight inches in diameter, and from an eighth of an inch to an inch deep, according to the size of the seed to be sown, placing a label with the name in the center. The labels ought to be five or six inches long, painted white, and marked with a lead pencil before the paint gets dry; in this way the name will last a long time. Larkspurs, and many of the hardy annuals, when sown late in autumn, lie dormant all winter, thereby making much stronger plants, and flowering earlier than those sown in spring. The dwarf Rocket Larkspurs, when sown on the edges of the borders, present a beautiful sight with their various colors; the seed requires to be sown in October, and protected by a slight covering of straw during winter. Phlox Drummondii are of all shades and colors; they delight in a moist and shaded situation; seed sown one eighth of an inch deep in May, blooms from June until October.

572. **List of Choice Annuals.**—The following choice list of hardy annuals was made by Thomas Cavanach, a practical, sensible floriculturist in Brooklyn, N. Y. It is worthy of the attention of all who desire to beautify their homestead.

Nemophila Insignis, or Blue Love Grove.—Seed sown in May, blooms in July; likes a rich soil and moist situation; suitable for vases.

Abronia Umbellata.—A very pretty annual, with long trailing stems, bearing beautiful lilac and white flowers; very fragrant suitable for vases; seed may be sown early in April, flowering in June.

Aster Chinensis, or China Aster.—This beautiful annual comprises over twenty-five different varieties. Truffaut's, for general cultivation, is the best, on account of the beauty of its flowers and variety of their colors; seeds sown in the open ground in May, in rich soil. All single or semi-double flowers should be pulled up and thrown away.

Calliopsis, or Coreopsis.—This is a very showy annual—fourteen different varieties; flowers, bright yellow, mottled with a rich velvety crimson, highly ornamental; seed may be sown in October or early in April; easily transplanted.

Balsam, or Lady's Slipper.—A well-known tender annual. The camelia-flowered contains twelve varieties, of all shades and colors, variously striped and mottled. Seed sown in the open ground in the latter part of May. To have them early, seed should be sown in pots in the house in April, and transplanted to the garden when four inches high. Plant singly, pulling up all semi-double or single flowers.

Cuphea Platycentra.—A very pretty annual or green-house perennial, with scarlet and purple flowers, suitable for vases; flowering all summer, and in winter, if taken up in autumn and kept in the house; sown in pots in the house in April. Plants may be procured from any florist for a trifle.

Cypress Vine.—A splendid running vine, delicate foliage, bright crimson flowers, of a star shape; Alba, pure white. Seed sown in the latter part of May; likes a rich soil. A very ornamental pyramid may be made by setting a straight pole in the ground six or eight feet high, surrounded by a hoop three or four feet in diameter, fastened to the ground with three pegs; run strings from the top of the pole to the hoop. Sow the seed outside of the hoop. It may also be trained over arches or vases.

Lathyrus Odoratus, or Sweet Pea.—One of the prettiest and most fragrant of the popular annuals which ornament the flower-garden. The sweet pea grows four or five feet high in rich soil. The plants should be tied to a stake or an old tree. Sow the seed in April; flowers in July.

Ageratum Mexicanum.—A half hardy annual, with light blue flowers. Seed sown in May; flowers in July, blooming profusely until killed by the frost.

Alyssum Maritimum, or Sweet Alyssum.—This is a hardy annual, growing one foot high; flowers white; very fragrant. Seed may be sown in autumn or early in spring.

Cacalia, or Scarlet Tassel Flower.—A very pretty annual, with scarlet and orange tassel-shaped flowers. Seed sown first of May; blooms from July until October.

Eschscholtzia California, or California Gold Flower.—Flowers bright yellow, very showy. This, with slight protection during winter, will flower the second season; blooms from June until October.

Clarkia Elegans.—A hardy annual, very showy. Seed sown in September flowers much better than when sown in spring. For spring sowing, plant early in April, in poor soil.

Mirabilis Jalapa—commonly called Four-o'clock, from its habit of opening its flowers about that time in the afternoon. *Mirabilis* is a Latin word for wonderful. The roots of this plant, when dried, form the principal constituent of the jalap of druggists. It is generally considered an annual; it has a large tuberous root which, if taken up in October, and stored in a dry cellar, will flower the second season. Seed sown in April; flowers in June.

Scabiosa, or Mourning Bride.—A variety of colors, from a jet black to a deep lilac. Seed sown in May; blooms in the latter part of June.

Zinnia Elegans.—One of the most showy annuals in cultivation; flowers, brilliant scarlet, white, orange, and light purple. The new double-flowered Zinnia forms a beautiful addition to this class of annual flowers. The flowers resemble the double French marigold; they will bear transplanting. Seed sown in May; blooms in July.

Clintonia Elegans.—A beautiful, tender annual, covered with deep-blue flowers; grows about six inches high. Seed sown in May, in light, rich soil; blooms in July and August.

Gomphrena Globosa, or Globe Amaranthus.—Five different colors; the seeds are rather difficult to vegetate; they require to be soaked in warm water. The flowers, if gathered and kept in a dry place, will retain their color for several years. Seed sown in May.

Mignonette is one of the sweetest of the annuals. Thousands of pots of it are sold annually in the markets of Paris and London. It has been found growing upon the walls of ruins near Paris, springing from every crevice where the seed could germinate, and scenting the air with its fragrance. The mignonette is of very easy culture; in rich soil it grows luxuriantly, but with poor flowers, that have little or no fragrance; but in poor soil the flowers will be large and very fragrant. When once the seeds are planted, it will retain possession of the soil, springing up year after year. Seed sown in May almost upon the surface of the soil.

Among the curious annuals is the *Mimosa*, or *Sensitive Plant.* Seed sown in the open ground in May, in rich soil. This singular plant, at the slightest touch, closes its leaves.

> "Weak with nice sense the chaste mimosa stands,
> From each rude touch withdraws her tender hands."

Mesembryanthemum, or Ice Plant.—This curious plant has thick leaves, which have the appearance of being covered with ice; very ornamental for vases. Seed sown in May.

Loasa Acanthifolia.—A running vine, covered with curious yellow flowers; the stem and leaves are covered with hairs or small bristles, which, upon being touched, leave a stinging sensation similar to nettles. Seed sown in May.

Coix Lachryma, or Job's Tears.—A kind of ornamental grass. It is called

Job's tears on account of its shining, pearly seed, which, by a considerable stretch of the imagination, may be likened to a falling tear. Seed sown in May half an inch deep.

The *Avena*, or *Animated Oat*, is a curiosity. When the seeds have fallen off, their strong beard is so sensitive to the various changes of the atmosphere, that they are continually in motion, like some insect crawling on the ground. Seed sown in April.

Anagallis, or *Pimpernel.*—A dwarf-trailing plant, with blue and pink flowers. The anagallis has been termed the Poor Man's Barometer. Not the pimpernel alone closes its flowers when exposed to damp air, but many other plants are equally sensitive. *Stellaria Media*, or *Chickweed*, and many others, shut their flowers upon the approach of rain.

Another gardener gives the following list as a choice selection for a small garden:

Alyssum Maritimum—Sweet Alyssum.—A very desirable dwarf annual, with small, white, honey-scented flowers in great profusion, blooms for a long time.

Asters.—Showy, hardy annuals. The fine German and French asters are certainly among the finest flowers we have.

Balsams.—The camelia-flowered balsams are most beautiful, and very desirable.

Cacalia, or Tassel Flower.

Calliopsis, or Coreopsis.—Very showy and rich.

Candytuft.—A large quantity should be grown of this plant for bouquets.

Clarkia.

Eschscholtzia.—Very showy and handsome.

Everlasting Flower.—Fine for winter bouquets.

Four-o'clocks.—A well-known plant, desirable in large gardens.

Globe Amaranthus.—Excellent for winter bouquets.

Jacobea, or Senecio.—Very pretty.

Marigold.—The dwarf varieties are pretty.

Mignonette.—Sow plenty of this for bouquets.

Nasturtiums.—The dwarf varieties much resemble Tom Thumb geraniums, and are very desirable.

Nemophila, or Love Grove.—Plants with very small but pretty flowers. Dwarf.

Petunias.—Among the very best plants; of easy culture, and flowering profusely the whole season.

Phlox Drummondii.—The very best annual; of long duration in bloom, rich in color, excellent for bouquets; unequaled in all respects, in my estimation.

Poppies.—Very showy, and great variety.

Portulaca.—One of the best annuals.

Scabiosa, or Mourning Bride.—Showy.

Stocks.—Many annual varieties are cultivated, and are very desirable.

Sweet Sultan.—Quite pretty.

Whitlavia.—A very beautiful blue flowering annual.

Zinnia.—Very showy, free flowering plants.

573. **Hardy Flowering Herbaceous Plants.**—The following list gives a good

assortment of some of the most desirable hardy flowering plants, some of which grow and bloom in beauty every year with almost no care. Of course the list can be greatly extended, or selections can be made from this and others to suit each taste. To many who do not know what to select, these lists will be useful guides. We will briefly notice some of the most desirable sorts.

Achillea Ptarmica.—Of the double-flowering variety, dwarf, continues in bloom a long time, good for bouquets, flowers small, of a pure white.

Aconite.—Monkshood, mostly with blue flowers; various hights.

Althea Rosea.—Hollyhock, double varieties, very beautiful, all colors; six or seven feet high.

Anemone Japonica.—Japanese Wind-flower, purplish red flowers. double; about two feet in hight.

Baptisia Australis.—False Indigo, fine blue flowers; two to three feet high.

Campanula.—Bell-flower, many varieties, with white and blue flowers; various hights, all pretty.

Delphinium.—Larkspur, one of the best herbaceous plants, with fine blue or white flowers. *D. formosum* and *grandiflorum* are the best.

Dictammus Fraximella, or Gas plant.

Dielytra, or Dicentra Spectabilis.—The very finest herbaceous plant.

Funkia, or Day lily, many varieties; all desirable.

Iris, or fleur de lis (flower de luce).

Lychnis Chalcedonica.—The double variety has splendid scarlet flowers.

Phloxes.—A splendid class of plants, all beautiful, without any exception.

Pyrethrum.—Feverfew, double white flowers, very neat and pretty.

Spirea.—Meadow Sweet, many varieties, all desirable.

Tradescantia.—Spiderwort, with white, blue, or red flowers, very pretty.

Valerian.—A tall-growing plant, with fragrant white flowers.

Viola Odorata.—Sweet Violet, very fragrant.

Chrysanthemum.—Much improved of late years, and in several varieties, is one of the most desirable of hardy flowering plants, and is very much loved wherever known. It is one of the very last to flower and cheer us with its many-headed blossoms for the last three months of the departing year, when most other plants have gone their way. Then, again, it is one of the very best window plants. It not only flourishes, but luxuriates in-doors, if properly cared for. As floral ornaments for the green-house and conservatory, they are unsurpassed.

To get early flowers from chrysanthemum seed-plants, you must sow the seed early in April in pots in the house, and transplant, or else sow seed in a very nicely prepared warm bed in May. Be careful to thin out, so as to give ample room for the plants to branch out.

574. **Bulbous Flowering Plants.**—The earliest flowers of the garden come from bulbs planted in autumn. In a well-prepared bed, nicely sheltered with a coat of leaves, the crocuses begin to bloom almost as soon as the

covering is removed, after the frost is out of the ground. All tender bulbs and perennials under a coating of leaves will keep sound till spring. It is necessary to lay brush or something else over the leaves, to hinder their blowing away by the winds. Leaves make the best kind of covering for all tender things. Frost rarely penetrates through a thick coating of them, as may be seen during our most severe weather; by removing a bed of leaves the ground will be found unfrozen.

There is no sight more striking to the eye than the effect produced in early spring, when delicate snowdrops and the modest, many-colored crocuses enamel the lawn, or make the garden lovely with their stainless purity, and with the brilliancy of their colors. Coming, as they do, before the swallow, these firstlings of the season have a special claim to the popular regard. They are the harbingers of buds and blossoms, of leafy trees and unbound waters, of sunshine and of singing birds, and when their tender green spears begin to push themselves through the soil, we know that nature is awakening from her winter slumbers, and that more genial weather is at hand. These little pilgrims that come to us with glad tidings, and that put on for our delight the gayest robes, and silently, yet eloquently, assure us that we are entering upon a new cycle of soft sunshine, and bland airs, and fragrant odors, deserve to be more cherished than they usually are by all countrywomen. Of all the flowers that bloom, those that come to us earliest are entitled to receive the most cordial welcome, and it is for this that we appeal in behalf of the more general culture of bulbous flowers.

We appeal to all farmers' wives and daughters for a more general cultivation of flower gardens and parterres around the house, because we believe in their humanizing influences; in the lessons they teach, and the sympathies to which they appeal. We believe every family who has ground should cultivate *Hyacinths*, *Tulips*, *Jonquils*, *Crocus*, *Crown Imperials*, *Iris*, *Snowdrops*, *Polyanthus*, *Narcissus*, *Double Narcissus*, *Lilies*, *Gladiolus*, and *Dahlias*. To these add *Peonies*, *Dielytra* (*Dicentra*) *Spectabilis*, and many other hardy herbaceous plants, such as *Hollyhocks* and the *Phloxes*, *Yucca filamentosa*, etc.

Of all the bulbous flowering plants, the gladiolus takes the lead, according to our fancy. The varieties of *G. gandavensis* are numerous, robust, stately, with beautiful taper leaves of bright green, and long racemes of exquisitely beautiful lily-shaped flowers, comprising every variety of shade of colors, which can be kept up by timely planting from July to October in the open air; and then, before hard frosts come, if stalks with undeveloped buds are cut and set in water in the house, they will continue to bloom some time longer. The bulbs must be taken up for winter, and need about the same protection as onions.

Several bulbs, hyacinths in particular, may be grown in any room where water will not freeze, in glasses adapted to the purpose, so that the bulb rests in the mouth of the glass, and sends its roots down into the water. Dark-colored glasses are preferable to white glass. The water should not be allowed to rise more than to touch the bottom of the bulb; otherwise they will rot. When first put in glasses, they should be stored away in a dark, cool place, till the roots are about an inch long. If the roots do not grow vigorously, give two or three drops of hartshorn in each fresh supply of water, and put in the glass a small lump of charcoal. The water should be changed every fortnight, or three weeks at farthest; but to do this the plant must not be taken out, but the glass held horizontally, and the water poured off. Soft or rain-water should always be used. By this mode of treatment, and not keeping them in too warm or close a place, they will bloom beautifully.

They may also be grown in the house in pots, in the open light and air. The bottom of the pot should have plenty of broken tiles in it to allow of perfect drainage, and be frequently, but moderately, supplied with water. Do not stand the pots in saucers of water.

575. **The Hollyhock** is a fine flower to grow in clumps about a lawn, and may be made perennial by not allowing the stalks to ripen seeds. As there have been great improvements made in these flowers, we annex the names that two dozen fine sorts are known by among seedsmen.

576. **Select List of Hollyhocks.**—1. *Anak* (Bircham).—Crimson; flowers of a fine form and full.

2. *Black Prince* (Gibbon).—Flowers large and very double; black.

3. *Brennus* (Bircham).—Light crimson; a fine, showy variety.

4. *Charles Baron* (Chater).—Flowers very large and full; color pink, shaded with salmon.

5. *Beauty of Chestnut* (Paul).—Flowers of a very fine form; spike long, and beautifully furnished with flowers of a beautiful bright rosy red; a very fine variety.

6. *Charles Turner* (Black).—Spike very close; flowers of fine form, large, and of good substance; color deep crimson; extra fine.

7. *Commander-in-Chief* (Baron).—Flowers large and showy; dark-red.

8. *Eva* (Roake).—Flowers large, shape very fine; color peach.

9. *Emperor* (Roake).—Form quite first-rate; color a beautiful pink; one of the finest.

10. *Felicia* (Bircham).—Flowers and spike of excellent form and substance; color amethyst; extra.

11. *General Bem* (Veitch).—Spike very fine, flowers full size: color bright red.

12. *Hon. Mrs. Ashley* (Roake).—Flowers medium-sized, of great depth, and very double; color a delicate peach.

13. *Lilac Model* (Chater).—Flowers medium-sized, full, and of good substance.

14. *Mrs. Foster* (Turner).—A noble spike; flowers large, of first-rate form; color beautiful light rose.

15. *Miss Parsons* (Parsons).—Spike full; flowers medium and close; color pinkish salmon; fine.

16. *Magnum Bonum* (Baron).—Flowers very large; guard petals broad, but not quite substance enough; very showy.

17. *Margaret Ann* (Black).—Spike very fine; flowers good form, very compact; color bright rose.

18. *Model of Perfection* (Baron).—Many better models at the present day; color creamy white.

19. *Susannah* (Veitch).—Flowers medium-sized and moderately smooth; color creamy white.

20. *Pyramid* (Parsons).—Flower medium-sized; spike close and good; color buff.

21. *Poupre de Tyre* (Bircham).—A noble spike; flowers large and free; color rich dark-purple; a first-rate variety.

22. *Penelope* (Bircham).—A very showy and beautiful variety; color fine rose.

23. *Walden Gem* (Chater).—Spike very fine; flowers large and of fine form; color deep crimson.

24. *Minnie Gray* (Loring).—Size medium, form good; color white.

As these have all been produced by planting seeds, and saving none but the finest flowering plants, we recommend a continuance of the practice by all who grow hollyhocks.

577. **The Verbena** is an almost indispensable plant in lawns, it is so pretty to fill up cut figures in the sward. The name, verbena, is an unmeaning one, being derived from the Latin *herba*, which means any low, spreading plant. This plant has been very long in cultivation, and it was used in ancient times in some of the sacred ceremonies, the altars and priests' heads being wreathed with verbenas. Celsus speaks of the use of verbenas as a febrifuge in sickness, but it is doubtful whether it was the same plant known now by this name. The verbena is indigenous in the country of Buenos Ayres, and was taken from there to England in 1825, and to this country ten years later, by Robert Buist, of Philadelphia. Now it is known everywhere and is everywhere a favorite, as its cultivation is simple, and its low-creeping habit and pretty flowers will keep it in favor until some new rival comes to take its place. It flourishes best in sandy, rich loam, in garden-beds, and blooms from midsummer till late in autumn, and if potted, continues in bloom through the winter. Verbenas do not require frequent watering; they will grow upon very dry ground, and wet in excess mildews and injures them. For pots, take half-and-half leaf-mold and good loam, and add sand enough to give a preponderance of sand in the whole mixture. As it is naturally a running plant, it must be cultivated in that way, and not, as we have seen it, with stiff, upright stems. Nothing is more easy than producing new varieties of colors in verbenas. We have only to grow seedlings and select the best and cast away the remainder. All colors, except light-blue and yellow, have been obtained. The following are the names of a few of the latest new varieties, with their characteristics annexed:

Giant of Battles.—Flower and truss large, habit good, foliage large; color dark-scarlet, with purplish eye; a new imported variety.

Dred.—Flower medium, habit weak, a good bloomer, but of a dull, purplish, lake color; pretty for variety.

Admiral Dundas.—Foliage and habit good; color velvety scarlet; fine.

Celestial.—A strong, rapidly growing variety, the leaves often two inches across; truss large, elongated, forming a fine head; color pink, with darker eye; desirable for its size and color.

Mrs. Abbott.—Habit and foliage good, truss small; color very dark, velvety purple, light eye; fine.

Evening Star.—Color dark-crimson, with well-defined whitish-pink eye; growth small; a decided novelty, and a very striking flower.

Rosy Gem.—A lovely verbena, foliage and flower of medium size; color rosy lake, with light eye; extra fine.

For an ordinary purpose, however, some that have been long in use, that can be bought for a tenth or a hundredth part of the price of these new sorts, might give equal satisfaction, for the varieties have been so multiplied that it is difficult to tell which are the favorites.

578. **Flowers Grown as a Farm Crop.**—There are many persons in France who grow flowers as an exclusive crop. It is their sole dependence. "The growing of flowers, for the production of fine essential oils and for medicinal purposes, is confined mainly to the southern portion of the department of Var, lying on the Mediterranean, adjoining the late Italian, but now French, province of Nice. There are extensive factories in Nismes, Montpelier, Nice, and in Algeria, but the great center of this branch of industry is the town of Grasse, lying some few miles inland, and its sea-port, Cannes, the winter residence of Lord Brougham.

"It would be impossible to state, even approximately, the product of the flower-fields of this interesting region. There are no less than sixty factories in Grasse, giving employment, in the various departments of field and in-door labor, to 5,000 persons. Many manufacturers grow their own flowers, others buy them in the open market daily, and still others are supplied by contracts. The latter system prevails among the leading houses. Contracts are made at a fixed price for a term of years for the total product of a farm, at rates varying from 8 to 10 cents per kilogramme ($2\frac{1}{5}$ lbs.) of rose leaves, up to \$1 for tuberose leaves, and even higher rates for violet leaves, which last are mainly grown at Nice. The average prices are about as follows:

Rose leaves	8 to 10 cents the kilogramme.	Acacia	60 to 80 cents the kilogramme.
Jessamine	40 to 50 " "	Tuberose	100 " "
Orange	40 " "	Violet	80 to 1 30 "

"These are the leading garden flowers used in Grasse; only small quantities of the jonquil, narcissus, mignonette, etc., are cultivated. A great breadth of land is devoted to lavender, rosemary, thyme, and other medicinal plants, which are sold at much lower rates than the above.

"The preparation of all these plants divides itself mainly into four classes: essential oils, distilled waters, pomades and oils, and dried flowers. The great bulk of essential oils produced consists of lavender, rosemary, sage, thyme, spikenard, and others of a terebinthine nature; the most valuable oils produced in any quantity are those of Neroli and Petits Grains. The former is the result of the distillation of orange-flower water from the petals of the flowers of the Bigarade, or bitter orange (the sweet or Portugal orange yielding an inferior product), and the latter is obtained from the green leaves of the same tree. The price of Neroli varies, with the seasons, from $30 to $45 the pound, and of Petits Grains from $8 to $12. These two oils are extensively used in the composition of Cologne water, and in combination with bergamot, give it its distinctive character. The orange-flower water is consumed in immense quantities in France, in the 'eau sucrée,' so universally drank in the hot season. This, by the way, is the only shape in which a Frenchman will drink water at all. The Bigarade orange-tree requires ten years to mature and twenty to obtain perfection, and yields an average of seventeen pounds of flowers per annum.

"Rose water is also distilled in large quantities. A result of its distillation is an exceedingly small quantity of otto of rose of the very highest quality; it appears in small supernatant grains or drops, which are carefully skimmed off and rectified. It is superior to the famous Kizanlik, or Turkish otto, and congeals, at ordinary temperatures, in beautiful, transparent crystals. The 'Rose de Mai,' or double May rose, is the one universally grown.

"Another very costly article, of which less than one ounce had been produced in 1855, is the essential oil of jessamine. Up to that period its existence in the plant was stoutly denied by the distillers, although to what other principle the fine odor of the plant was due, they failed to prove. In that year an Algerian chemist obtained a minute quantity, which cost him, as we were informed, at the rate of 17,000 francs the kilogramme, or $90 the ounce. It has, since then, been produced at a cheaper rate, but still too dear for commercial purposes. The wild Arabian jessamine is grafted on the cultivated plant of the same species, acclimated, and bears for many years, if not winter killed, yielding 90 to 150 lbs. of flowers per thousand plants. It is closely trimmed in spring, and deeply covered in winter. The caterpillar is its most formidable enemy.

"A most important branch, and one in which great rivalry exists, is the preparation of perfumed pomades and otto, which have a two-fold use: first, as bases for the finer kind of pomatums and hair oils; and next, as a medium for obtaining spirituous extracts for the toilet, such as Lubin's well-known extracts for the handkerchief. Their preparation is the most interesting and curious feature of the Grasse establishments, and merits a word of description. For the oils, the inodorous virgin olive oil is used, expressed from olives just before their maturity.

"The pomade 'body,' which is prepared in winter, is composed of one part of beef suet and two parts of leaf lard, thoroughly hashed, washed in several waters, and among the best manufacturers it is washed several times in rose water to deprive it of all unpleasant odor, and then carefully melted and stored away in huge tin cans in airy, cool vaults, for use in the season of flowers. The busy operations of the year commence with the rose season.

"There are two processes for impregnating the pomade body and the oils with the floral odors—one by infusion, the other by 'enfleurage.' The first is employed for the strong, less volatile odors of the rose, orange, and acacia; the latter for the sensitive, ethereal perfumes of the jessamine, tuberose, jonquil, and all the bulbous tribe, which will not endure the application of even a moderate degree of heat.

"And first, by infusion; about 100 kilogrammes of the pomade body are put into a tin-planished copper water-bath, melted at a low temperature, and charged, at daybreak, with a certain quantity of the freshly gathered flowers, which are stirred constantly during the day and night, the mass being kept only warm enough to maintaim a semi-fluid state. About midnight it is removed from the fire, put into strong bags made of fish-cord, and subjected to heavy pressure in large, perforated, vertical iron cylinders, standing on marble bed-plates, which are gently warmed to prevent the congelation of the exuding mass. Next morning fresh leaves are added, and the process repeated daily until the desired strength of perfume is obtained, when the pomade is put into cylindrical tin boxes and sealed up for shipment. The oils are treated in like manner, but are filtered instead of pressed.

"In preparing the oils, coarse, heavy, spongy cotton cloths, made especially for this purpose at Marseilles, are saturated with oil and spread upon the netted frames; flowers are then strewn thickly upon them, and they are piled up in like manner as the pomades. When sufficiently charged with odor, the oil is expressed from the cloths by powerful levers.

"Many hundred-weight of flowers and herbs are dried annually, and are variously used in the healing art, and in the composition of scent-bags, cachous, fuming pastils for the sick chamber, and kindred compounds of the perfumer's art.

"The Parmezan, or double violet, is grown under the shade of trees, and yields a delicate and delightful perfume. It was the favorite odor of the Athenians under Pericles, and is now the fashionable scent of the Parisian *beau monde*.

"The flower farms receive the highest culture; under-draining is not practiced, but great attention is paid to irrigation. Some fields have a complete network of irrigating tubes substantially laid in cement. A constant warfare is waged upon insects, each plant having, as with us, its pet borer, grub, or bug, and 'eternal vigilance is the price' of success. The heat in summer is intense, though tempered by the sea breeze, and the winter is at times as rigorous as in Washington or Richmond.

"Labor costs, per day, 35 to 40 cents for males, and 15 cents for females."

There is no other reason than that contained in the last sentence why flower farms can not be established in this country as well as France. The question rests entirely upon the cost of labor.

579. **Soil for Flowers—Compost for Potting—Protecting from Insects.**—All flowers require a deep, rich, well-drained soil, and that should be annually fertilized with a fine compost, in which wood's earth or leaf-mold predominates. The following directions of a practical gardener, though given mostly in reference to potting plants, will be found useful, the same soil being good for flower-beds, particularly for an annual dressing.

"To have suitable compost for plants, the different soils should be mixed for some time before they are wanted. In making composts, the following soils should be obtained: First, soil and turf from an old pasture; second, decomposed horse or cow manure; third, peat soil or leaf mold from the woods; fourth, white sand; fifth, coarse sand or gravel; sixth, charcoal and broken pots. The charcoal and broken pots are for drainage. A suitable compost for fuchsias, roses, and geraniums consists of one part white sand, one of leaf-mold, and one of decomposed manure and turf-mold. These should be well mixed together and sifted before using. A compost for cactus is made of sand, leaf, and turf-mold, with a good drainage of charcoal and broken pots. All bulbous roots require a very rich soil composed of equal parts of sea sand, rotten cow manure, peat soil, and good turf-mold.

"In taking plants out of pots, all that is necessary is to put the hand on top of the dirt and then turn the pot bottom up, and hit a gentle rap, and the ball of earth will slip out. Most people water plants too little. Two or three times a week is necessary, or oftener in a dry stove room.

"To grow flowers in the greatest perfection, gardeners often cover them and take great pains to preserve them free from contact of insects or the pollen of other flowers.

"The thing of most importance in potting is suitable soil. Many persons imagine that all that is requisite is earth, be it good or bad. We have seen plants potted in common street manure, the owners laboring under the impression that it was the very best kind because it was black.

"Unsuitable soil and large pots generally given to small, weak plants for the purpose of causing them to grow, is, in nine cases out of ten, the cause of their death.

"Giving small pots to weak plants encourages the growth of the roots toward the side of the pot in search of air and moisture. In potting plants, glazed pots should never be used, as they prevent the evaporation of all impurities through the sides of the pot.

"Of all the insects which infest house plants, the green fly, red spider, and mealy bug are the most difficult to get rid of. They are easily destroyed in the green-house by tobacco smoke. For parlor plants, take a pail of soft water, invert the plant over the pail, cover the surface of the pot with a piece of paper to prevent the soil from falling out, and brush the leaves downward with a dust brush, dipping the plant in the water several times. The mealy bug may be found in the axils of the leaves of orange-trees, camelias, passion flowers, and various other plants. They look like small specks of cotton, and are only to be got rid of by picking them off. If plants should happen to get frozen, they should be syringed with cold water and screened from the rays of the sun. Thus plants are frequently saved that would otherwise be destroyed."

SECTION XXXII.—LAWNS—HOW TO MAKE AND HOW TO KEEP THEM.—TREES AND PLANTS SUITABLE FOR LAWNS.

A COUNTRY house without a lawn! it is a house in a desert! It is not a structure in the midst of beauty. There is nothing—not even expensive statuary, flowers, and shrubbery—that adds so much to the surrounding embellishments of a farm-house or suburban residence as green grass upon a well-kept lawn, and it is a beauty that is permanent and inexpensive. If the ground is well under-drained and the grass well dressed in the fall, it will start fresh as soon as the snow is off, and often earlier, and it keeps green through the most severe drouth upon ground that has been well prepared. With here and there a shade, what a lovely sight it is to see children playing upon a smooth lawn! With what glee they run from tree to tree, the old dog joining with great satisfaction in the sport! In spring, in summer, in autumn the lawn is beautiful, and even in winter it speaks of refinement of the resident occupants. It tells, too, of art and industry in man, since lawns are seldom, if ever, found in a natural state. The sea of grass upon the Western prairies is only beautiful when seen at a distance. It does not bear close inspection like the velvety sod of a lawn.

Whenever we see a lawn turning brown in summer, we know that it was neither trenched with the spade nor subsoil plowed, without which manuring will not always preserve its perpetual green.

Those who build country houses are too apt to expend their means upon a grand mansion, expensive out-buildings, ornamental fences, fine carriages and horses, and sometimes gaudy, inappropriate furniture, which is all unsatisfactory to visitors of refined tastes, if the grand house is not embowered in trees, and has no grassy lawn.

580. **How to Set a Lawn in Grass.**—A small lawn may be covered with sods; a large one must have the sod formed upon it. Two quarts of white clover seed, mixed with a bushel of the chaffy seed of red-top, and sown evenly upon the third of an acre of well-prepared ground, will form a fine lawn turf. Some add a little seed of the vernal or sweet-scented grass that is so fragrant in new-mown hay. To make the ground perfectly level and smooth, if the space is small, rake it carefully; if it is large, use the roller.

If you intend to use sod, prepare the ground as smooth as possible after having worked it deep and finely pulverized, and then go with your barrow, if the distance is short, to the spot where you will cut your turf. If far distant, of course a cart must be used to haul home the load. If less distant, an ox-sled will be found more convenient. In cutting sods, do not take them up by the spadeful, but stretch a line and cut through the sod with a sharp spade. If much is to be cut, it would be better to do it with a plow-coulter, ground sharp, and set in a beam with handles, and guaged to the right depth. An implement could be made with but little expense that would cut the edges and bottom all at once. If cut with a spade, line off the courses exactly a foot wide, and cut the sods evenly one and a half inches thick and roll up a course upon a handspike as big as two men can carry to the vehicle that is to transport it, and carry the roll in the same way to the ground prepared for your lawn and unroll just as you would a carpet. Afterward use the roller or something to compact the sods down firmly in place.

581. **Clipping the Lawn.**—More persons fail in the care of than in the making of a lawn. They can not see the necessity of the frequent clippings, without which they can not have a good lawn turf. One has only to look at the sod of a once-a-year clipped mowing field and compare that with a closely-grazed pasture or roadside sod, and see which is preferable for a lawn. Let it be set down as a rule, that a lawn can not be clipped too often, and that it must be clipped twice a month, and that it will improve the sod to roll it as frequently. If there is grass enough, so they would not wear it out, a troop of playful children upon the lawn every day would make the sod grow thick and firm and the grass fine and soft. It is a good thing for a lawn to go over it every spring in a rainy day and scatter grass seed wherever there is the least show of bare ground.

582. **Watering and Manuring the Lawn.**—If you have a hydrant, have a long hose with a showering nozzle, and use it often in dry weather; otherwise you must, if you desire to see your grass always green, water by hand or with a watering cart or garden engine. It will greatly add to the advantage of watering if you will dissolve some fertilizing substance in the water—a few pounds to a hogshead-full. You may use guano, salt, niter, lime, potash, soda, and several other ingredients. If there are grubs in the sod, salt them to death. Carbonate, phosphate, or sulphate of lime may all be used at times to advantage on a lawn, sowed on in moderate quantity. A dressing of well-decomposed compost is the only manure that should be applied, and that in the fall or early spring.

583. **Cause of Grass Dying Out upon Lawns.**—Many persons who have taken much trouble to make small grass-plats or lawns around their dwellings have found the grass dying out without being able to account for it. Ruth Lynde, a practical woman of New Bedford, Mass., gives the following as the cause. The cure will be readily suggested by reading what she says.

"I have had the grass destroyed in two different places where I have resided, and found the same cause productive of the same result at each.

"During the winter and spring the servant girls were in the habit of throwing soap-suds, after washing clothes or dishes, upon the grass-plat, and

I noticed invariably that the plantain and sorrel came up instead of the grass. Here, at my mother's, I have a bit of a garden, and there is a grass-plat also, and since I urged upon her notice the ill effects of soap-suds upon the grass, and she commanded its discontinuance, the grass has come in again, and much white clover with it. Most houses in the country have a patch of plantain around the kitchen doors, and the same habit of throwing out soap-suds is the cause of its growth."

Although this effect is produced by deluging grass with soap-suds at the wrong season of the year, there is no better fertilizer than it for grass, if diluted and put on with a sprinkler.

584. **A New Lawn Grass, or Evergreen Plant.**—Within a few years, a new plant has been introduced into cultivation to a considerable extent in England, and to a limited extent in this country. It is more successful in the moist climate of that country than it is in the drier climate of this, but it is still worthy of notice. It is thus described:

"The new plant is called '*Spergula pilifera*,' and is a neat-growing dwarf, hardy, perennial-tufted Alpine plant, forming close, compact, wiry, grass-like stems, from a quarter to half an inch in hight—at first erect, afterward decumbent, clothed with closely set green bristle-like leaves, which, by permanent growth and occasional rolling, form an unbroken, level, velvet-like surface of the richest conceivable verdure, remaining uninjured in severe drouth or intense cold, and assuming the same beautiful verdurous tint during the winter months as in summer. The seedling plant of this highly interesting object starts into growth with a single unbranched, perpendicular radicle or root, and afterward manifests a remarkable power of extension in its ramifying hair-like roots, penetrating to the depth of one to two feet; a fact quite sufficient to account for its enduring the opposite extremes of severe heat and cold. In addition to its hardiness, under the vicissitudes of an English climate, its value is considerably enhanced in its adaptation to all the varieties of common garden soil, requiring but a thin firm surface-stratum of one-inch ordinary sifted or broken loam. Maintaining its verdant freshness alike beneath storm and sunshine, it combines every needful feature of adaptation with economy, and a uniform aspect of neatness with the least possible care or attention. Its fertility in bloom during the month of July is equally beautiful, being at that period studded over with myriads of low, compact, salver-shaped snow-white blossoms, appearing not as in fancy, but in reality the living picture of an emerald-green velvet carpet, spangled with innumerable stars. From the preceding remarks it will be seen that the established growth of this plant maintains a dwarf close web of green verdure, and entirely dispenses with the extra toil and expense of mowing; its numerous small brittle flower-scapes being removed by the gentlest movement of a wing or brush over the surface of the lawn, either while in bloom or afterward, and these constitute the only surface-growth or tokens of its beauty, which require this operation but once a year. For small or medium-sized lawns, terraces, verges, mounds, etc., this remarkably interesting and beautiful little plant offers an object of great interest to every lover of gardening pursuits, and every lady amateur cultivator may superintend and personally manage the slight attentions required to preserve the terrace margins or velvet lawn in the highest condition. The permanent and uniform condition of dense growth, with the penetrative power of its roots, preserves it from all risks of being parched by extreme exposure in sultry weather, and the progressive accumulation of its moss-like growth gives an elastic pressure to the foot, much softer than the finest Turkey carpet. The seed may be sown either in or out of pots, in the usual method observed for fine seeds, with a slight but uniform covering of soil, and placed within either a frame, cool pit, or green-house, using the usual precaution of shading the seed-pans from intense sunlight daily for a few hours, until well germinated, after which it may either be re-planted in stores of ten to fifty plants within dishes or large pots, or otherwise planted out in rather a shady border of the open ground for a few weeks, and ultimately transplanted upon the prepared lawn-surface in two or three plants, within one inch or more of each other, and such little plant-groups may be formed at a distance of six, nine, or twelve inches apart. In such positions the growths will progressively meet and form the rich and beautiful surface now described. It is also admirably adapted for picturesque green tufts and edgings on avenue lines and borders, for grouping the front spaces of massive rock-work, and surfacing partially raised mounds around classic fountains and basins or artistic columns, where grass is unavailable for mowing, and equally telling for cultivation in larger vases in alternate effect with the silvery sheen of the beautiful *Cerastium tomentosum* on terrace verges and architectural approaches."

Another account says: "Plats established four years since, have grown into a close sod, and give promise of a continual healthy endurance."

585. **Ornamenting Lawns.**—More ornamental than statuary, expensive rock-work, or any other structures, are well-arranged beds of flowers, and groups of flowering plants and shrubs. These may be provided for in laying down a lawn, or the sod may afterward be cut out in forms to suit the fancy, for flower-beds. This kind of ornamentation should be attended to by the mistress of the house, and if she have daughters, let them always be advised or instructed in the plans, and in carrying them into execution. Select neat plans for cutting the sod for flower-beds. In this follow nature. Sometimes the form of a maple-leaf may be adopted. In other places, use a grape-leaf, or a grapevine with several leaves, for the form of your bed. Again, take the crooked branch and limbs of a tree for a pattern.

586. **How a Woman Made and Ornamented a Lawn.**—The following letter from a "Housewife" of Colchester, Vt., is worthy of a place here, as encouragement to all other housewives to persevere in the same way, until they also compel husbands to acknowledge their success. Our correspondent says:

"The cultivation of flowers, and beautifying the surroundings of home, should be attended to as well as in-door work, lest that love of the beautiful, which is implanted in every heart, should perish through neglect. Many housewives are so entirely devoted to cooking, house-cleaning, and sewing, that they can not have a minute's time even for reading, except on Sundays, and then they 'are so tired, they had rather rest than read.'

"I hereby advise them not to cook so much, not to scrub so much, and sew with a machine. Others will say they have so many human flowers to attend to, that they can not cultivate any others, and these will let their door-yards run to waste and weeds instead of having them seeded down, and flower-beds cut in the rich, green turf.

"I have cultivated a few of the common kinds of flowers ever since I was a child, but have lost the delight of seeing some new, strange flower expand its beauties to my view, because I knew not how nor where to procure an assortment of choice, rare seeds. Last spring, I accidentally looked over a flower-seed catalogue with much interest, because it was the first of the kind I had ever seen. I found I could have new and lovely flowers at a very trifling expense. My ambition was fired; I gave my husband no peace until he had the kitchen-garden removed to the rear of the house, and removed the fence which separated the old kitchen-garden and the door-yard, thus making a fine little lawn. I got a man to help me—not a gardener—we have no professed gardeners within ten miles. I drew the plan of my flower-beds myself, and had the man cut them out of the turf in the desired forms.

"Previous to this, I persuaded three or four housewives—all mothers of families, with plenty to do—to join me in sending for flower-seeds and roots. These we exchanged with each other, thus obtaining a fine variety at a small expense. We followed the directions given in the catalogue, and were very successful with the most delicate seeds. My lawn was beautiful; indeed, so rich and varied were the effects of French and German asters, German balsams, German stocks, English pansies, phloxes, verbenas, and dahlias, from seed the first season, that my husband, who had at first ridiculed my flower venture, was obliged to acknowledge its success.

"Last fall I sent for a few hyacinth, crocus, and early tulip bulbs, and had a fine display of flowers in our living-room during the dreary winter months. My room is even now filled with the exquisite fragrance of hyacinths, which still continue in bloom. I hope this article will attract the attention of my toil-worn sisters; they can have no idea what a source of purest enjoyment the cultivation of flowers will be to them. Its influence has been very beneficial to my little ones, who watch the expansion of the delicate and wonderful buds with an interest fully equal to my own."

587. **Planting Lawn Trees.**—We beg of you not to plant in rows, nor any form of mathematical precision. Follow nature; go to the woods for a pattern, or rather to some natural park, like the bur-oak groves of Michigan and Indiana. Keep in view "what for?" every time you set a tree. The object is either ornament or shade; it is not to fill up. Keep also in view the fact,

that the tree you are planting is to grow. It requires a combination of skill, taste, judgment, forethought, that few persons possess, to plant the trees in a lawn, great or small—from a door-yard to a royal park.

The great thing to remember is this: a short green grass and compact sod is the leading beauty of a lawn or park, and trees and flowers are only thrown in to fill up or hide ugly spots, or break the uniformity, or furnish agreeable shade. Make everything—grass, trees, flowers, rocks, water, walls, fences—to look as natural, and just as little artificial, as possible, and your lawn will excite admiration in strangers and satisfaction in yourself.

You need not entirely exclude fruit-trees, shrubs, and vines from the lawn. In some places an apple-tree may be entirely suitable. In others a grapevine, to climb a blank wall or dead tree. A quince-tree at the north, and an orange-tree at the south, would be ornamental in a park or large lawn. Study fitness of things, and thus obtain beauty and utility combined.

588. **Botanical Names of Trees and Plants.**—We do not know of a more appropriate paragraph for this section than the following, which gives a long list of names of trees suitable for planting in a lawn and other places, for ornament and shade, with their proper botanical names, as well as those by which they are most commonly known.

It is so important for farmers, and particularly farmers' children, to learn the botanical names of trees and plants, so as to be able to identify them by the names common to the same trees in different localities, and the means of obtaining such information in the country not being easy, we employed Andrew S. Fuller, a horticulturist of Brooklyn, who has been all his life in the nursery business, to make out such a list as will be most useful. In proof of the necessity of using botanical names, look at the variety of names in a single family; for instance, the oaks, and so of the maples or the birches.

If a person speaks of a "birch-tree," what do we understand? For several years a paragraph has been floating through the press, recommending a decoction of "walnut leaves" with which to wash horses in fly-time, as a certain preventive of annoyance from these pests of the horse and his rider; but we have never been able to find an individual that could tell for a certainty what the writer of that article meant by "walnut leaves." In New England the term walnut is almost universally applied to the hickory (*Carya*) family, not even distinguishing between the five varieties of this class of trees, all of which are spoken of in that section under the general term of walnuts. At the South and West nothing is known by the name of walnut but the *Juglans nigra* ("black walnut"), and *Juglans cinerea*, the butternut of New England, known at the West as the "white walnut." Now, with such a confusion of names, who can tell what a writer means when he talks about "walnut leaves?" Let him add the botanical name, and we can then understand.

589. Trees Indigenous to the United States:

Common Names.	Botanic Names.
Silver Maple	Acer dasycarpum.
Great-leaved Maple	Acer macrophyllum.
Red Maple	Acer rubrum.
Sugar Maple	Acer saccharinum.
Black Maple	Acer nigrum.
Striped Maple	Acer striatum.
Horse Chestnut, or Buckeye	Æsculus Ohioensis.
Red-flowering Chestnut	Pavia rubra.
Yellow-flowering Chestnut	Æsculus glabra.
White Birch	Betula populifolia.
Yellow Birch	Betula excelsa.
Red Birch	Betula rubra.
Canoe Birch	Betula papyracia.
Black Birch	Betula lenta.
White-heart Hickory	Carya tomentesa.
Shagbark Hickory	Carya alba.
Shellbark Hickory	Carya sulcata.
Bitternut Hickory	Carya amara.
Pignut Hickory	Carya porcina
Pecan-nut Hickory	Carya oliviformis.
American Chestnut	Castanea vesca.
Chinquapin Chestnut	Castanea pumila.
Catalpa	Catalpa syringæfolia.
Nettle-tree	Celtis occidentalis.
Hagberry-tree	Celtis crassifolia.
Smooth-leaf-tree	Celtis integrifolia.
Wild Cherry	Cerasus Virginiana.
Choke Cherry	Cerasus serotina.
Judas-tree, or Red-bud-tree	Cercis Canadensis.
White Fringe-tree	Chionanthus Virginica.
White-flowering Dogwood	Cornus Florida.
Red-flowering Dogwood	Cornus Sanguinea.
Persimmon	Diospyros Virginiana
Red Beech	Fagus ferruginea.
White Beech	Fagus Americana.
Black Ash	Fraxinus sambucifolia.
White Ash	Fraxinus acuminata.
Walnut-leaf Ash	Fraxinus juglandifolia.
Broad-leaf Ash	Fraxinus latifolia.
Long-leaf Ash	Fraxinus longifolia.
Blue Ash	Fraxinus quadrangulata.
Red Ash	Fraxinus pubescens.
Honey Locust	Gleditschia tricanthus.
Thornless Locust	Gleditschia inermis.
Kentucky Coffee-tree	Gymnocladus Canadensis.
Black Walnut	Juglans nigra.
Butternut	Juglans cinerea.
American Larch	Larix microcarpa.
Sassafras	Laurus sassafras.
Sweet Gum	Liquidambar styraciflua.
Tulip-tree	Liriodendron tulipifera.
Osage Orange	Maclura aurantiaca.
Cucumber-tree	Magnolia acuminata.
Yellow Magnolia	Magnolia cordata.
Great-leaved Magnolia	Magnolia macrophylla.
Umbrella-leaved Magnolia	Magnolia tripetela.
Broad-leaved Magnolia	Magnolia latifolia.
Florida Bread-tree	Malia azederach.
Ash-leaved Maple	Negundo aceroides.
California Negunda	Negundo Californicu
Pepperidge-tree	Nyssa multiflora.
Sour Gum-tree	Nyssa aquatica.
Iron Wood	Ostrya Virginica.
Button Wood	Platanus occidentalis.
California Plane-tree	Platanus Californica.
American Aspen	Populus tremuloides.
Great Dentate Poplar	Populus grandidentata.
Weeping Poplar	Populus pendula.
Birch-leaf Poplar	Populus betulifolia.
Cottonwood	Populus Canadensis.
Balsam Poplar	Populus balsamifera.
Cotton-tree	Populus argentea.
Various-leaved Poplar	Populus heterophylla.
Custard Apple	Percelia triloba.
Wild Plum	Prunus Americana.
Chickasaw Plum	Prunus Chicasa.
Mountain Ash	Pyrus Americanus.
Crab Apple	Pyrus coronaria.
Willow Oak	Quercus phellos.
Laurel Oak	Quercus imbricaria.
Downy Black Oak	Quercus tribola.
Water Oak	Quercus aquatica.
Quercitron Oak	Quercus tinctoria.
Black Jack Oak	Quercus nigra.
Scarlet Oak	Quercus coccinea.
Grey Oak	Quercus ambigua.
Red Oak	Quercus rubra.
Pin Oak	Quercus palustris.
Shrub Oak	Quercus ilicifolia.
Post Oak	Quercus obtusiloba.
Over-cup Oak	Quercus macrocarpa.
Mossy-cup Oak	Quercus oliviformis.
White Oak	Quercus alba.
Chestnut Oak	Quercus prinus.
Yellow Oak	Quercus cestanea.
Swamp White Oak	Quercus bicolor.
Rock Oak	Quercus montana.
Stag's-horn Sumach	Rhus typhina.
Smooth Sumach	Rhus glabra.
Mountain Sumach	Rhus copallina.
Poison Sumach	Rhus venusta.
Yellow Locust	Robinia pseudacacia.
Gum Locust	Robinia viscosa.
Cypress	Taxodium distichum.
American Linden	Tilia Americana.
White Linden	Tilia alba.
Paper Linden	Tilia heterophylla.
American Elm	Ulmus Americana.
Slippery Elm	Ulmus fulva.
River Elm	Ulmus nemralla.
Wahoo Elm	Ulmus slata.
Yellow Wood	Virgilia lutea.

590. Evergreen-Trees Indigenous to the United States and Territories:

Common Names.	Botanic Names.
White Spruce	Abies alba.
Hemlock Spruce	Abies Canadensis.
California Spruce	Abies amabilis.
Douglass Spruce	Abies Douglassii.
Menzies Spruce	Abies menziessii.
Mexican Spruce	Abies Mexicana.
Black Spruce	Abies nigra.
Red Spruce	Abies rubra.

Common Names.	Botanic Names.
Sabine's California Spruce	Abies Sabini.
White Cedar	Cupressus thuyoides.
Lambert's Cypress	Cupressus Lambertiana.
Great Coned Cypress	Cupressus macrocarpa.
Mexican Cypress	Cupressus Mexicana.
Red Cedar	Juniperus Virginiana.
Great Flowered Magnolis	Magnolia grandiflora.
Balsam Fir	Picea balsamea.
California Noble Fir	Picea noblis.
White Pine	Pinus strobus.
Yellow Pine	Pinus mitis.
Jersey Pine	Pinus inops.
Scrub Pine	Pinus banksiana.
Pitch Pine	Pinus rigida.
Long-leaved Pine	Pinus palustris.
Pond Pine	Pinus serotina.
Mountain Pine	Pinus pungens.
Loblolly Pine	Pinus tæda.
Lambert's Californian	Pinus Lambertiana.
American Arbor Vitæ	Thuya occidentalis.
Giant Arbor Vitæ	Thuya gigantea.
California Torreya	Torreya Californica.
Great Californian-tree	Sequoia gigantea.

591. **Foreign Evergreen-Trees, common in the nurseries of this country:**

Common Names.	Botanic Names.
Silver Spruce	Abies argentea.
Dwarf Alpine Spruce	Abies crunoniana.
Blue Spruce	Abies cerulea.
Norway Spruce	Abies excelsa.
Spruce, Himalaya	Abies morinda.
Spruce, Mucronate	Abies mucronata.
Spruce, New Holland	Abies Novæ Hollandiæ.
Spruce, Yew-leaved	Abies taxifolia.
Spruce, Narrow-leaved	Abies tenuifolia.
Chili Pine	Araucaria imbricata.
Chinese Lance-leaved Pine	Araucaria lanceolata.
Brazil Pine	Araucaria Braziliensis.
Billwill's Pine	Araucaria Bidwillii.
Moreton Pine	Araucaria Cunninghamii.
Norfolk Island Pine	Araucaria excelsa.
Graceful Pine	Araucaria gracilis vel elegana.
Cedar, African Green	Cedrus Africanus viridis.
Cedar, Deodar, silvery foliage	Cedrus deodara.
Cedar, Green Deodar	Cedrus deodara viridis.
Cedar of Lebanon	Cedrus Libani.
Mount Atlas Silvery Cedar	Cedrus Libani argentea.
Japan Dark-green Yew.	Cephalotaxus adpressus.
Fortune's Chinese Yew	Cephalotaxus Fortunei.
Mountain Yew	Cephalotaxus montana.
Chinese Yew	Cephalotaxus Chinensis.
Japan Weeping Cypress	Cryptomeria Japonica.
Japan Dwarf Cypress	Cryptomeria nana.
Cypress, Australian	Cupressus Austraus.
Cypress, Spreading	Cupressus expansa.
Cypress, Chinese	Cupressus funebris.
Cypress, Graceful	Cupressus gracilis.
Cypress, Weeping	Cupressus pendula.
Cypress, Pyramidal	Cupressus pyramidalis.
Cypress, Sacred	Cupressus religiosa.
Juniper, Silver-leaved	Juniperus argentea.
Juniper, Berry-bearing	Juniperus bacciformis.
Juniper, Bermudas Cedar	Juniperus Bermudiana.
Juniper, Chinese	Juniperus Chinensis.
Juniper, English	Juniperus communis.
Juniper, Cracow	Juniperus Cracovia.
Juniper, Himalaya	Juniperus excelsa.
Juniper, Irish Spiral	Juniperus Hibernica.
Juniper, Hudson's	Juniperus Hudsonii.
Juniper, Japan	Juniperus Japonica.
Juniper, Phenician	Juniperus Phœnicia, or Lycia.
Juniper, Sacred	Juniperus religiosa.
Juniper, Swedish	Juniperus Suecica.
Juniper, Spanish Incense	Juniperus thurifera.
Fir, or Spruce, European Silver	Picea pectinata.
Fir, Weeping Silver	Picea pectinata pendula.
Fir, Kumaon Pindrow	Picea pindrow.
Fir, Altaic	Picea pichta—Sibirica.
Fir, Mount Atlas	Picea pinsapo.
Fir, Nepal purple-coned	Picea Webbiana.
Pine, Austrian Black	Picea Austriaca.
Pine, Calabrian	Pinus Calabriensis.
Pine, Siberian Cembran	Pinus cembra.
Pine, Nepal short-leaved	Pinus Gerardiana.
Pine, Haguenea	Pinus Haguensis.
Pine, Aleppo	Pinus Halepensis.
Pine, Dwarf mountain	Pinus mughus, or pumilio.
Pine, Italian stone	Pinus pines.
Pine, Scotch Pine, or Fir	Pinus Sylvestris.
Yew, English	Taxus baccata.
Yew, Silver-striped	Taxus baccata argenteis.
Yew, Weeping	Taxus Dovastonii pendula.
Yew, Irish Spiral	Taxus Hibernica fastigiata.
Arbor Vitæ, Fern-leaved	Thuya asplenifolia.
Arbor Vitæ, Australian	Thuya Australius.
Arbor Vitæ, Japan	Thuya Japonica.
Arbor Vitæ, Nepaul, or Tartarian	Thuya Nepalensis.
Arbor Vitæ, Chinese	Thuya Orientalis.
Arbor Vitæ, Siberian	Thuya Sibirica.

592. **Our Native Creepers.**—Three principal varieties of our native creeping plants, that is, climbing by rootlets or suckers, are generally confused in the minds of the people, and all go by the name of Poison Oak. This mistake has contributed to cause the neglect of several highly ornamental creep-

ing vines, under the impression that they were poisonous. A brief description of the three varieties referred to is here given, so that any common observer may readily know them.

Poison Oak, *Poison Ivy* (*Rhus Toxicodendron*).—Climbing by rootlets over rocks, etc., or ascending trees; leaflets three, rhombic-ovate, mostly pointed, and rather downy beneath, variously notched or cut lobed, or entire. Common in thickets. Flowers greenish-white or yellowish. June. Poisonous to the touch to some persons.

Virginia Creeper (*Ampelopsis Quinquefolia*).—A common woody vine growing in low rich grounds, climbing extensively, the tendrils fixing themselves by dilated, sucker-like discs at their tips; blossoming in July, ripening its small blackish berries in October. Also called American Ivy. Leaves digitate, with five oblong lanceolate leaflets; turning bright crimson in autumn.

Trumpet Flower, *Trumpet Creeper* (*Tecoma Radicans*).—Climbing by rootlets; leaves pinnate; leaflets from five to eleven, ovate, pointed, toothed; flowers, trumpet-shaped, or tubular tunnel form, from two to three inches long.

The last two are not poisonous, and may therefore be safely grown to climb around piazzas or any other part of the house. The first is very pretty to climb old park trees or rocks, and being the most hardy, may well be grown for such purposes. It should have a label, giving its name and notice that it is poison.

593. **Roses and their Enemies, and Flowers for the Lawn.**—There are but few farm-houses destitute of roses of the hardy and most common sorts which can be grown without labor or care. Many persons would have more and better ones if they knew what to get and how to get them, and that a beautiful assortment of a dozen could be bought for three or four dollars. The moss roses are beautiful, and some of them quite hardy. Bourbon roses flower in lat. 41° and 42° from June to October. These require winter protection. China roses are perpetual bloomers, and also require protection. Tea roses are exceedingly fragrant, and fine for potting. Boursault roses of different varieties keep up a succession of blooms. Prairie roses are hardy climbers. One called the Queen of the Prairies, and the Baltimore Belle, are very showy. Fortune's yellow rose is a climber, but not hardy. Noisette Augusta is a very fragrant climber, but too tender for winter in the Northern States, Noisette Cloth of Gold is a very large, beautiful rose that may be grown here in sheltered situations. Noisette Solfatere is a good rose to train to a pillar; it is sulphur yellow. La Morgue rose is very large and creamy white, good for training, and blooms abundantly. We could go on a long time naming roses, but that is not the object—it is to urge more attention to their cultivation, and more knowledge and better taste in making a selection.

In Mississippi, and other Southern States, there is a rose largely used for hedges, called the Cherokee rose, which, although only a small single flower, is very fragrant, and makes a beautiful show upon a long line of roadside hedge, as it is white, with a yellow center, and the foliage a rich green, and the vines often twenty feet long, and the hedge often ten or twelve feet high and equally wide, so covered with white flowers as to show at a distance like a long bank of snow.

594. **Rose-Slugs and Rose-Bugs** are the great enemies that have to be contended with, and in some localities they are so bad that many persons have abandoned growing fine roses. There does not appear to be any effectual remedy for these pests. In some cases, air slaked lime scattered over the bushes and under them seems to have the desired effect. In other cases it failed entirely. Occasionally, a writer states that he saved his roses by syringing the bushes with whale-oil soap. Then some one else states that he used it to no purpose. The successful man replies: "You used it too weak." Another one answers: "I used it strong, and killed all the leaves and buds on my rose-bushes." Again we are told that a decoction of ailanthus leaves will keep off the rose-destroyers, if sprinkled upon the bushes. As this is a cheap remedy, let it be tried; we have some faith in its value.

Rose-bushes in clusters are lovely ornaments of a lawn, and should not be neglected any more than evergreens.

SECTION XXXIII.—HOT-BEDS, COLD FRAMES, AND PLANT PROTECTORS.

FARMERS, in general, look upon each of the things named as the title of this section as belonging rather to market gardeners than farmers. They see them on what are usually denominated "gentlemen's places," and look upon them rather as a luxury than a necessity. In this they are quite mistaken. A hot-bed can be made upon any farm by any man after reading this section, and once made, it will be found such a comfortable addition to the garden that it will not soon be dispensed with.

595. **Conversation of Gardeners about Hot-Beds.**—The following conversation upon this subject at one of the meetings of the American Institute Farmers' Club, gives the necessary information, with the names of the speakers for authority:

Mr. Quinn, farmer and gardener upon Prof. Mapes' farm, said: The earth for hot-beds should be gathered from woods, or rich mold, and composted in summer, and well worked over, and in the fall covered with dung manure, so as not to freeze. This is so as to have it in order for sifting when it is wanted. The manure is very carefully prepared—one part of it so as to heat, and one part not. The cold manure is first spread eight inches thick, and then a layer of hot manure, and then a layer of cold, and then covered with the prepared earth. The frame is made so that the sash will shed rain and set on the bed, and the earth and manure filled in all around, and then the sash is covered with mats, and seed not sowed for four days. The ground being carefully prepared, and seeds sown, the sash is kept close one day, and the second day opened. Some seeds start much easier than others. Cabbage seed would spoil before egg-plant seed would begin to germinate. We transplant from the seed-beds to other beds, and we are careful to give the plants air, but it must be done with care, because the new plants are so tender that they are easily killed by too much air at first. We prefer a southeastern exposure for our hot-beds. The size of each may be from three and a half by five feet to five by eight feet. The former we make eighteen inches high in front and thirty inches in the rear. Our frames are four by six feet, and the mats five by eight feet, so as to lap over the edges to keep the beds warm. We generally sow the different varieties of seeds in separate beds, as the plants require different treatment.

We sow the seed for cold frames in September, and transplant in October into the cold frames, setting from 500 to 800 plants under a light of glass. The glass is covered in winter with boards, and air is given in mild days; and we sometimes set the plants out in the field so early that snow covers them, yet without injury.

R. G. PARDEE—A neighbor of mine at Palmyra used to sow seed in open ground, and before freezing covered the plants with mats, and before winter he puts over a frame covered with boards, and on them earth, leaving one end open for air as long as he dared to, and then closed up both ends, and occasionally ventilated the bed during winter. He said that he had used oiled cotton cloth as a substitute for glass, with good success.

Mr. CAVENACH, gardener, of Brooklyn, stated that he had successfully grown cabbage plants in a similar way to the above, using salt hay for a covering.

Mr. FULLER showed an improved form of glass for hot-beds, rounding on the lower edge. This tends to keep the flow of water in the center.

Mr. WHEELER, of Wayne County, thinks this an important question for the country, if farmers can be taught so as to make cheap hot-beds for family use.

WM. S. CARPENTER—My plan for a hot-bed for family use is to prepare my ground in the fall by digging out the earth two and a half feet deep, and leave the sash on over that hole till March, when I put in the manure and earth prepared for the seed, and sow it. I plant corn and other vegetables in pieces of inverted sods, so as to take up the pieces of sods with the plants rooted in them. I have thus been able to get green corn the first of July. My hot-bed lettuce I do not pull up, but cut off, and the root sprouts out successive crops.

Mr. Wright, of Poughkeepsie, said that he used half turnips, in place of sods, for corn. He inserts the seeds in the turnip, and that rots, and the corn grows rapidly. Melons may be grown in the same way.

John G. Bergen—Any farmer may put down a hot-bed about March 1st, and fill in two feet deep of manure and dirt, and if he has no mats to cover with, he may cover with boards. One of the most important things about growing hot-bed plants is giving them air judiciously. The cabbage plants of the Long Island market gardens for early plants are grown from seed sown in the fall, and the plants preserved in cold frames. These cabbage plants are set early in spring, in frames like hot-beds, but without heat, and there grow under glass, large enough to set, by the time the field is ready. Then the plants of the late cabbage are from seed sown in the open ground in April, May, or June. The ground for cabbage plants should always be very rich.

596. **Hot-Beds on the Surface Recommended.**—A letter to the author from a practical gardener gives his reasons for not excavating the soil for a hot-bed. He says: "For the reception of the bed, a trench is often dug of its determined length and breadth, and sixteen inches deep, if the soil is wet, or eighteen, or more, if it is dry. In a dry soil and climate this can not be productive of much injury, but otherwise it almost always chills the bed; at the same time it is to be observed, that it is never productive of benefit, further than not being so high, it is easier of access, but gives much additional trouble, both at the time of founding and afterward, when linings are to be applied."

And another says: "The bed of dung may be placed either wholly on the surface of the ground or in a shallow trench of from six to twelve inches deep and four or five feet wide, according to the frame; but if made entirely on the surface, it affords an opportunity for renewing the linings when the heat has declined; in a trench, the wet settling about the bottom of the bed, chills the dung, and causes the heat soon to decline.

"Now, from the 1st of January to the 31st of March, in the Northern States, neither soil nor climate are dry, strictly so; and it is plain to see that in the most favorable soil the shed of rain from the sash is directed at once upon the dung in the front of the trench, which in the case of the surface-bed is all thrown off by the, as it were, thatched slope of the linings. I should think it could hardly be denied that the decline of heat in the buried mass of dung in the one case would be very much greater and more rapid than from the action of cold winds upon the linings of a surface hot-bed.

"Beds of dung for hot-beds are more frequently made about eighteen inches or two feet in entire depth than three or four feet; there are many small gardeners who have not sufficient dung to form beds of greater depth, and it is important that they should have the most enduring heat possible to be got from this scant supply, and as more dung accumulates, to have the means of renewing the linings to keep up a protracted warmth inside. By building on the surface, both can be secured with less trouble and more chance of success."

597. **What a Hot-Bed is for.**—"A hot-bed is not a mere make-shift, nor a cold frame, nor a pit, but a bed of dung for forcing purposes—one in which it is not the mere object to start seeds and guard the young plant from changes of weather, but to force things to grow out of season by giving the plants the most uniform and prolonged heat practicable, until they can be safely transferred to the open garden or into special frames, with an extraordinary advancement in growth. Yet with all of the well-known advantages to be derived from hot-beds, but few comparatively possess one. Surely the farmer deserves the first fruits of the season, and he may have them if he will. Lettuce, cabbage, cucumbers, tomatoes, cauliflower, melons, etc., may be upon his table from four to six weeks earlier than usual, by a little painstaking, at a season when the time to do this work can be easily spared from other occupations."

598. **How to Make a Hot-Bed.**—"The first thing to be done is to determine the size of the bed wanted. If it is only for family use, and to supply a few friends with early plants, twelve feet long and six feet wide will be ample. To make the frame, take two-inch planks, cut them into suitable lengths, and nail or hook them to cedar posts, set at the four corners. If hooks are used, the planks are more easily taken apart and stored away after the season is over. These posts should be three or four inches square. The frame has, of course, no bottom. The back should be about three feet high, the front a foot and a half, and the ends made with a regular slope from back to front. So made, the rain will be carried off from the sash, and the light will reach all the plants within. The sash may be made like a common window sash, except that there are no cross-bars, and the panes of glass overlap each other a quarter of an inch at the bottom, so as to shed rain like the shingles of a roof. The sash should be made of good seasoned pine, one and a half to two inches thick, and painted three good coats. Small panes, say 6×8, are less liable to breakage than larger; and in glazing, they should be bedded in soft putty. For the sash to rest and slide upon, strong strips should be placed across the frame, and morticed in at each end. Choose a good situation for a bed, with a dry bottom, and sheltered, if possible, on the north and west sides. Determine the size you need, and then drive stakes at each corner. Now, wheel on the manure. The litter and strong manure from the horse stable is the best; but in lack of this, tanner's bark may be used, or leaves; oak-leaves are best. If dung is to be had, lay up a bed of it, six inches to a foot wider on all sides than the frame which is to rest upon it, pressing it down gently and equally throughout. The average hight of such beds is from two to three feet. If, as some persons prefer, the bed is sunk a foot or more in the ground, the manure need not rise more than two feet above the surface. Having set the frame and sash upon the

dung-bed, with the lower side toward the south, let the whole lie a few days, until the most violent fermentation has passed off; then put on about six inches of the garden-mold. The part devoted to radishes and lettuce may have a foot of soil. In a few days the seed may be sown, which should be done about six weeks before the usual time for transplanting to open grounds. Examine the bed daily, and if the heat becomes excessive, run a stake or crowbar down into the manure to let the steam escape; the sashes, also, may be raised a little. If the ground becomes dry, water occasionally with tepid water; if the heat declines, keep it up by the addition of fresh manure piled up around the side of the bed. In cold nights, cover the beds with matting or straw. The only danger is from the generation of too violent heat and the prevalence of steam from the fermenting materials. Tan bark has been successfully used to cover with, as this keeps the steam from rising." See 565.

599. **Cold Frames.**—The use of cold frames among market gardeners is very important. The plants are started in the open ground in autumn, and taken up and set very close in the frames, or else the seed is sown in them and started with glass, and afterward covered with boards and mats, or straw and dirt, and the plants thus kept in a sort of torpid state till spring. Such plants are more hardy for open culture than hot-bed plants.

600. **Protection of Plants.**—Many plants, called hardy, require winter protection in our climate. The best covering is leaves, and the more you let remain in the spring to rot the better, because they furnish the best of all manurial substances. The earth-covering needs to be but slight. Some tender shrubs should be bent down, and slightly covered. Coarse manure should be used where leaves are not at hand. Clean straw will answer to protect the roots. Evergreen boughs answer a very good purpose, and so they do to tie around shrubs. Tea-roses are sometimes sheltered by a little roof of boards, covered with dirt.

Protecting plants from the sun is sometimes as necessary as protecting them from frost. The following easy plan of making these protectors of garden plants, upon a cheap scale, is recommended:

Take three pieces of boards, about a foot wide and fifteen inches long, and nail them together so as to form three sides of a box. Small braces at each corner will add to their strength. If they are made with the closed end narrower than the other, they can be packed into each other when stored away. The purpose of these boxes is the protection of plants from the sun or cold wind. By setting them on edge, so as to surround a plant on three sides, when the spring winds blow raw and chill, the advantage will soon be perceptible in the improved condition of the plants over those that are unprotected. If there is danger of a frosty night, a loose bit of board may be laid over the top of the box. A hill of melons, cucumbers, early beans, peppers, or any other tender vegetables, or a dozen or two hills of early corn, may be protected for a week or two with these cheap plant protectors. When they have been on during the day as a screen from wind, and there is no danger of a frosty night, they may be removed to give the dew full power upon the plants. In transplanting cabbage and other plants, these boxes, set up on their ends, make good shades, and they serve a good purpose when the soil is dry and plants or seeds need moisture, after the ground has been well watered. They serve also to protect melon-vines from bugs. This is done by setting a loose piece of board against the open side, so as to form a box and fence in the plants. The bugs will rarely get over this fence.

If you wish to transplant your cabbages, or anything in your flower-garden, do not wait for a season, but do it any day, just at night, in fresh-dug soil, giving the roots a good watering. Cover them daily with the protectors, taking them off at night, that they may be freshened with the dew. After a couple of days it will be sufficient to stand the protectors on edge on the south side of the plants to keep off the mid-day sun. In three or four days the roots will be established. Another use for them is when the weather is so dry that hills of melons, squashes, etc., will not come up. Water the hills with a fine rose watering-pot, and lay the protectors over the hills, and the young seedlings will soon make their appearance. When above ground, take off the protectors and let the dew fall upon them at night, and in a day or two dispense with it entirely. They are excellent, also, to cover over the patches of newly-planted flower-seeds, causing them to come up much sooner. Remove them when necessary to admit mild rains, and entirely when the plants appear. Try a few of them, and you will find they are far better than flower-pots, which are generally used for these purposes, excelling in cheapness, convenience, and utility.

Another cheap kind of sun-shades for plants is made in the following way:

Take a piece of stout hardware paper—say a foot square—and make a fold like the tuck of a woman's dress, half an inch wide through the center each way, and drive a tack through the crossing of the folds into the top of a stick, long enough to set one end in the ground and support the paper like an umbrella over the plant you wish to shade. Such papers will stand a good deal of wetting and recover again, though it is better to take them under shelter in a storm. Shades can be also made of large, dry leaves, tacked to a stick, or of coarse plats of straw. The lining of a tea-chest, cut up and tacked upon standards, the lead side up, makes good shades, durable, and cheap; and of whatever material, such shades often pay their cost in once using.

In some places it will be convenient to get branches of evergreens for shades, which are better than nothing, but are not so good as the three-sided wooden box, with a loose piece of board to form the other side or lay across the top. These are very convenient. Frames covered with cotton cloth are recommended as sun-shades. They may be made six feet long and three feet wide, and if needed to be thicker than the cloth, may be whitewashed with the mixture recommended in No. 361.

The following preparation for painting cloth, to be used for shading plants or for other out-door purposes, is recommended as cheap and durable by H. Carl Green, of Warren County, Pennsylvania. It is easily tried.

"Mix a pint of powdered lime with water till it is of the consistency of thick cream, and add this to a quart of boiled linseed-oil, and heat and stir; and then beat separately the whites and yelks of eighteen eggs, and stir all together, being careful not to heat hot enough to cook the eggs. Apply the mixture at once as you would other paint."

SECTION XXXIV.—SMALL FRUITS OF THE GARDEN.

As a general thing there is nothing about the farmer's home more neglected than small garden-fruits. Many do not have the least pretension to a strawberry-bed; and others who have one, do not seem to appreciate that there is as much difference in strawberries as in corn or potatoes, and that it is important to have a variety. Sometimes one sort will produce well one year and sometimes another; and one sort comes early and another late, in strawberries, raspberries, etc., just as it is with the varieties of corn. Currants, too, are not all alike; neither will the farmer receive the greatest profit from their growth when suffered to grow up like a neglected hedge along the garden wall. To induce a more extensive growth of these small fruits, we intend to give some pages to the subject, filled with practical information, and such hints upon the use of fruit, in a hygienic point of view, as will stir up the farmers, or certainly their wives and children, if it does not them, to increase the growth of this health-giving food. In families where garden-fruits are used the most extensively, you will always find the greatest degree of health. Instead of producing summer-complaints in the bowels, they are the very best preventives. Besides having some of them upon the table every meal while in season, you should preserve such quantities in sealed bottles or jars that you can have them without stint all winter, and until strawberries are ripe in June.

601. **Currants—Varieties and Cultivation.**—The currant is one of the most valuable of our small fruits—not as delicious as the strawberry and raspberry, but keeping much longer, and applicable to a greater variety of purposes, which makes it of more value in the family. As soon as the berries are well formed, and before they begin to ripen, they are used by many for pies and sauces. At maturity there is nothing better for either of these

purposes, while for preserving and bottling, none of our fruits keep as well, and few are better for winter use; for jams and jellies, every housekeeper knows the currant has no superior. It also makes a wholesome domestic wine. For a dessert or table fruit it has been considered too small, too acid, and lacking in flavor, but this is not so with the finest varieties—the White Grape and La Versailles, for instance, with bunches five or six inches in length, and berries one and a half inches in circumference. The poor varieties, as usually grown, are certainly unfit for the table, as they are small, sour, and almost entirely filled with hard, woody seeds.

We consider the currant a most valuable fruit for every man who has a spare foot of ground. In cultivation it has been sadly neglected, receiving no pruning, or pinching, or training, or mulching, such as are lavished on its more favored neighbors. Not only has the currant been neglected by farmers, but by those who have given special attention to the raising of new varieties of small fruits, yet no variety has more valuable qualities. It is in perfection in the New York market the first part of July.

A writer in the *Indiana Farmer* speaks of currant bushes seven feet high, and of his success in growing the fruit, which he attributes to the fertilization of urine and soap-suds, applied during summer about the roots.

The "Cherry currant" averages a good deal more than double the size of the old-style crimson berries, of good flavor, and great productiveness. We are sure the profitableness of such a crop must be greater than any of the ordinary farm crops, nearly as ten to one, yet very few persons are engaged in the business, and but few who are not will believe we are serious in recommending growing currants in fields as large as their present fields of rye, corn, or grass. There is no danger of glutting the market any more than there is with ten-acre fields of strawberries, raspberries, pie-plant, or asparagus. The more there are grown the more the demand will increase, as it has for other fruits. Let us have a great increase in the production of currants, particularly while they sell fresh from the bushes at from four to ten cents a pound.

It is said that the Cherry currant does not bear pruning like the old sort—that the limbs should be tied up to short stakes. The best Dutch currants are obtained by careful trimming, cutting in the ends of the limbs early in the spring, and cutting away all three-year-old wood, and by hoeing very often.

One of the great faults about growing currants is picking them before they are ripe. Color does not indicate ripeness, as some are red long before they are mature. The Versailles should hang a long time after they are red; so should the Cherry currant, which is naturally strongly acid, and unfit to eat unless fully ripe. One of the peculiar characteristics of La Versailles is, that the fruit upon young bushes is generally small, and leads persons unacquainted with it to doubt its good quality. The Cherry currant grows about as large as ever the first time the bushes produce, and plants also grow vigorously from the first, while La Versailles is a feeble grower when young, but very strong when aged. Although some of these currants are good, we want something better. We want a currant of as vigorous a habit as the cherry, and as productive, with berries as large, combining all the good qualities of La Versailles, White Grape, Imperial, and Cherry, and sweeter than any of them. We need not despair of yet obtaining such a great desideratum. It is very easy to grow seedlings. Take the seeds of the best sorts out of the berries when ripe, by washing and mixing with sand, and putting in a box with earth, which should be placed on the north side of a building or wall, and kept till all danger of thawing and freezing is past, when the seed should be sown in drills in very rich ground, where the sprouts will grow four inches high the first year. Next spring transplant in rows where they can be cultivated. Cut off half the length of the plants when transplanted. The seed may be kept a long time in dried currants. The currant has a wide extent of growth, and one variety is a native of this country.

602. **Descriptive List of Currants.**—The following list of currants is given by Andrew S. Fuller, with their names in their order of excellence:

1. *La Versailles.*—Large red.
2. *White Grape.*—Large transparent white.
3. *White Holland.*—Identical with No. 2.
4. *White Provence.*—Much like No. 2.
5. *Yellow Imperial*—Large white, slightly tinged yellow.
6. *The True Red Dutch.*
7. *The Cherry.*—Large red, a little more acid than No. 1, and thicker skin.
8. *The Victoria.*—A late variety.
9. *La Hative.*—Red, early.
10. *La Fertile.*—Red, medium size.
11. *The Champagne.*—Pale red.
12. *White Dutch.*—Not large, but excellent.
13. *Imperial.*—Red, similar to No. 1 in quality; not so large.
14. *Angiers.*—Red, similar to No. 13.
15. *Red Provence.*—Late, and not worth cultivating.
16. *Gloire de Sablons.*—A new, worthless variety, striped.
17. *Old Striped.*—Similar to No. 16.
18. *Old White.*—A small, sweet variety.

The following short description of different sorts of currants will show how they vary, and enable persons unacquainted with them to make suitable selections.

Victoria is a late variety; light, bright-red; berries medium size to large, and bunches very long. A productive and beautiful variety.

Prince Albert is also a late variety; similar in color or a little lighter than Victoria; berries larger. Very productive.

The *White Dutch*, like the Red Dutch, is a good currant, but as a general thing has been so badly neglected that its true character is little known. It is a high-flavored fruit; berries larger and bunches rather shorter than Red Dutch; of a yellowish white, and very transparent skin. Very productive.

The *White Grape* is now the favorite white currant. This and the Cherry have been for some years the most popular sorts. Bunches long; berries very large, whitish yellow, sweet and good. Very productive.

Transparent is a new French currant; very productive, and similar to White Dutch. The *White Clinton* is very similar to White Dutch, and probably the same. *White Antwerp*, very large, white, sweet; bunches rather long, and productive. Neither of these, we think, is sufficiently distinct from the White Dutch and White Grape to justify their dissemination.

The *Black English* is the common, well-known black currant. With good cultivation and plenty of manure, it produces a good crop of fine fruit. It has a bad habit of dropping its berries at the time they get about ripe, so that the bunches when gathered have but few berries remaining.

The *Black Naples* is larger and better than the Black English, and is the best of the black currants. Bunches rather short, but berries very large. This is now about the only black currant planted, and is a most desirable variety.

The *Bangup* is an English black variety, with short, heavy bunches, shouldered. The berries hang on the bunches well, and bids fair to be a very valuable sort.

The roots of the black currant are short and fibrous, and consequently it has a small space in which to gather food. It is also a great feeder, and therefore requires a liberal supply of manure. The taste for the black currant, like that of the tomato, must be acquired, and then becomes a necessary luxury. Those who make wine should try the black currant for that purpose. In England it is preferred to all others for jams, jellies, and tarts, and black currant jam or jelly is there considered an almost infallible remedy for colds and sort throat, and invaluable in cases of fever. The good English housewife would hardly feel safe to pass through a winter without a good store.

Red Dutch is an old and well-known sort, with fair-sized bunches and berries. It is a good bearer and a free grower, and a much better currant than most people suppose, as any one can ascertain by giving it good culture.

Long-Bunched Red is very much like the above, but a larger berry and larger bunches, and we think a little more acid.

Short-Bunched Red has short, heavy, compact bunches. The berries, not quite as large as Red Dutch, hang on the stems well, and we think will make an excellent market fruit. It is the favorite sort of the growers for market around London.

The *Cherry* is, perhaps, the largest red currant, having berries of extraordinary dimensions. It is not a distinct species of the genus *Ribes*—only a new variety of *Ribes rubrum*, of which the Red and White Dutch and many others are also varieties. It is therefore just as hardy as the common currant. The distinguishing properties of the Cherry currant are: strong, robust growth of the bush, the shoots being stouter, the leaves larger, and of a darker green than the common sort. The blossom of the Cherry currant is easily distinguished from the greenish yellow blossom of the Red and White Dutch by its darker brownish color. But the greatest and most valuable distinction of the Cherry currant consists in the uniformly great size of the berries. They measure from half an inch to five eighths of an inch in diameter, all the berries of a bunch being generally of nearly one size, while the bunches of the common currant taper down to a very small berry at the end. Besides this, the berries are also distinguishable by their dark-red color. Another and very striking feature of the Cherry currant consists in the manner the bunches are distributed over the branches; while with the common currant the fruit is rather thinly—at least, by comparison—scattered over the branches, the Cherry currants hang in massive clusters so tight that the stems of the fruit-strings can scarcely be seen. Branches of the bush of from one to three feet in length are often unbroken clusters of luscious fruit, which give the bushes a charming rich appearance.

603. **How to Grow Currants.**—The following directions are given by Charles F. Erhard, a German gardener, Ravenswood, N. Y., a grower of Cherry currants:

"Many farmers and market gardeners seem to think that these good qualities can only be brought out by very high culture, such as the amateur gardener only can bestow on a few pet bushes. This is an error. I would say: Manure, plow, and hoe them as you do your Indian corn, and you will have them in as great perfection as the nurseryman.

"As the bushes grow very strong, they should be planted not less than 4×4 feet, or, perhaps, 4×5 feet apart, which will give 2,178 plants per acre. I prefer the latter method, and would plow only one way between them, allowing the branches to spread in the direction of the rows, so as to form something like a hedge. These rows should run north and south, to shield the bushes from the hottest mid-day sun. Shade to the fruit is indispensable to bring it to perfection; if too much exposed to the hot rays of the sun, the berries ripen prematurely before they attain their full size. Now, all the shade necessary to protect the fruit is furnished by the bush itself, if you do not disable it to do so by pruning and cutting away what was evidently intended for that purpose; and this brings me to the shape in which currant bushes should be pruned. I am aware that there exists a great difference of opinion among cultivators as to this point. Many believe that the tree-shaped is decidedly the best; others think the bush form, with several branches springing directly from the root, the better and most natural shape. I have tried both ways, but prefer the latter method greatly. The great advantage of the bush form, it seems to me, consists in the system of renewal which should be combined with it.

"Suppose you plant young bushes with two prongs or branches. Plant them deep and allow the first year two shoots to grow up from under the ground. These shoots will at the same time send out their own roots and grow luxuriantly. If you allow, then, every year two more shoots to spring up from the root, you will, in the summer of the fourth year, have two branches each of five, four, three, two, and one year's growth. Six of these branches, that is, the five, four, and three-year-old ones, will be loaded with fruit, the two-years' growth may have some berries, and those of this year's growth will only be straight shoots. The bushes will now be as large as they should be, and the two five-year-old branches may be cut out as soon as the fruit is picked; and henceforth, by allowing still two new shoots to come up every year, and by cutting out the two oldest branches after the gathering of the fruit, the bushes will be kept young and bear fine fruit for many years more. Of course this is only meant to elucidate the general principle. The practical cultivator will know how to modify the above rule for every individual bush."

604. **Productiveness of Cherry Currants.**—"In calculating the profits of a crop, great caution must be used, and casualties must not be forgotten. Although I have seen four-year-old bushes that bore nine pounds of berries to each bush, I would not think it safe to put down the average yield of a full-grown five-year-old bush, trimmed as above, at more than six pounds. This would amount to 13,068 lbs. to an acre. The price of common currants in the New York market, generally very small, sour little things, varies from four to seven cents per pound at wholesale, which certainly justifies the anticipation of six cents per pound for Cherry currants for many years to come, and this would make the value of the crop, per acre, equal to $784."

605. **Expenses of Cultivating and Gathering Currants.**—"Half a day of plowing and three days of hoeing by one man will clean and stir the ground of one acre most effectually, which, at ordinary wages of man and horse, will cost $3 50, which makes four plowings and hoeings cost $14. Picking 13,068 lbs., at one third cent per pound (about 15 cents per bushel), will be $43. If we allow $27 for manure every year, the whole expenses per acre would sum up to $84, leaving $700 clear, of which only the cost of bringing them to market would have to be deducted."

The above, although it is the statement of an interested nurseryman, is nevertheless the truth, not exaggerated. The fruit can be grown for two cents a pound, and every family can eat it as a condiment with their bread and meat every day in the year, and can afford to drink a delicious, wholesome wine—currant wine—instead of getting drunk and dying as they do now from poisoned stuff called beverages. We have no need of sending to Zante for currants, Madeira for grapes, or France for wine, nor should the folly be any longer tolerated of importing currant jelly. It is our duty, as American farmers, to grow this fruit, for we contend that if religion consists in doing good to our fellow-creatures, it is a religious duty to encourage the cultivation, the improvement, and propagation of all the fruits that a good Power has made the earth produce for man's sustenance and alleviation of human diseases.

The healthiness of currants is conceded by all physicians. Currant jelly is a most toothsome sub-acid condiment for convalescents, particularly those recovering from fever. It has been much sought for of late in army hospitals.

606. **Black Currants—How Grown for Wine in France.**—It is about twenty years since the manufacture of wine from black currants was commenced in the Department Côte-d'Or, France, upon a scale large enough to furnish a wine of commerce, since which the manufacture has increased very extensively; three houses at Dijon produced in 1860 about 88,000 gallons. Near Lyons, black currants are grown to sell to the Dijon wine-makers. There are other establishments at Beaune, and other small towns, and the manufacture is now so well established that landowners are cropping their land with black currants alone, the number of plants introduced into vineyards being also on the increase. The rage, indeed, for planting was so great in 1857, that rooted plants sold as high as $16, and even $24 per thousand. Now, however, price has found its usual level, that of $4 to $6 per thousand. The exact number of plants cultivated around Dijon does not seem to be ascertainable, the proprietors themselves not knowing how many they have planted. It is, however, probable that to estimate the number near Dijon at 1,500,000 would be greatly below rather than above the mark.

"In the Department of the Côte-d'Or, the center of currant cultivation exactly coincides with that of the vine. In fact, it may be said to extend from Chagny to Dijon in a narrow zone skirting the eastern slope of the mountain chain of the Côte-d'Or, eighteen to twenty-five miles in length, and from one to three miles in breadth. Within these narrow limits are to be found all the great growths of Burgundy wine, connected by vineyards only producing *vin ordinaire*. It is among these, and in land of a similar nature, that the black currant is cultivated. Many of the villages producing large quantities of the latter, are noted for the excellence of their wines, as, for example: Volnay, Beaune, Aloxe, Savigny, Prèmeaux, Nuits, Vougeot, Chambollo, Vosne, Morey, Gevrey-Chambertin, Brochon, Fixin, Marsannay, Talant, Fontaine. Leaving this center, the currant follows the vine in the valleys that traverse the mountain range toward the west. There are extensive plantations at Nolay, Plombières, Malain, Laumes, and Montbard, and others occur occasionally in the large and fertile plain which extends from the foot of the Côte-d'Or chain to the Saône, and in which the vine is not cultivated. Finally, they are to be found in the Department of the Saône-et-Loire, particularly in that part of it which adjoins the Côte-d'Or. Rather considerable plantations also occur near Autun and Châlon-sur-Saône.

"Contrary to what might have been expected in fruit with so strong a flavor, there exist great differences in the quality of the currants from different localities. The French liqueur-makers easily distinguish them, and carefully reserve currants of superior quality for first-class liqueur, which sells as high as 66 cents per quart, wholesale. In general, indeed, wherever wine is good, the currant is also good. By this is not meant the choice growths but *vins ordinaires*, the vines producing which are frequently grown along with currants.

"The currants are planted about four feet apart, and the after-culture consists in hoeing the ground deeply in the spring, and two or three hoeings during the summer to keep down the weeds. Pruning is done in the spring at the same time with the vines. As to soils, chalk or limestone, with a little clay in its composition, such as prevails in French wine districts, suits very well.

"In regard to amount of fruit, and the price that can be obtained for it, Dr. Maillard estimates that every bush that has been planted five years, when the land is wholly occupied with the currants, will yield $3\frac{1}{2}$ lbs. of fruit. The yield on bushes growing singly among the grapevines is much greater. Estimating the average yield at only $2\frac{1}{5}$ lbs. to a bush, and 2,240 bushes on an acre, we have 4,928 lbs. as the produce per acre. The average price of the fruit in former years was—in 1841, 80 cents per cwt.; in 1842 and '43, $1; 1844 and '45, $2; 1856 and '57, $4; 1858, $7 50; and in 1859, from $5 to $7. It appears that some of the most important houses in Dijon have contracted with growers to take all their crops for ten or twelve years to come at $3 per cwt. This would give $147 per acre as the price of the fruit. The trouble of growing black currants is very little, and they make a delicious and healthy wine, far superior to what is usually sold under the name of Port."

It must be seen from this statement that black currants could be profitably grown in this country for the same purpose. Indeed, they have been, to a limited extent.

607. **Strawberries—Profitable and Healthy.**—We suppose we need not offer argument to any one who has ever grown strawberries in the garden, to prove that no other fruit or vegetable can be grown with greater profit, whether for sale or use. Equally profitable for use as for sale, because promotive of health in an extreme degree; affording, too, a degree of satisfaction to the family not realized by anything else grown in the garden. This is owing in some measure to the circumstance of its being the earliest garden fruit, when nature craves just such sub-acid food as the strawberry alone furnishes, and if produced in such an abundance, of the most choice varieties, that all the family, hirelings included, can eat to their heart's content, we are willing to warrant that for the time being there will be a happy family; and while strawberries are in season, we will guarantee that the family has very little occasion for calling in the doctor. There is no fruit that can be indulged in to excess with so much impunity as strawberries. Therefore, for the promotion of health, wealth, and happiness, we urge farmers to pay more attention to their cultivation; and to enable them to do so judiciously, we will give them some valuable facts about how to make a good lection, and how to make them productive.

608. **The Best Sorts of Strawberries.**—It is just as important to grow the best sorts of strawberries as it is to grow the best varieties of corn and

potatoes. The trouble is to know which are the best sorts. Every locality has its favorite, and many individuals hold fast to the kind always grown in the family, and will not inquire whether there is a better one.

To enable those who wish to improve to do so, and to assist those who would like to make a selection of the best, we give the following opinions of competent persons.

During the strawberry season of 1859 the strawberry question was ably discussed before the American Institute Farmers' Club, and a committee was appointed to name six strawberries most worthy of general cultivation, in the order of their value. That committee reported the following, which was approved by a full meeting:

"1. *Wilson's Albany.*—Its promising good qualities are productiveness, size, and firm, juicy flesh. It is, however, too acid for the taste of many.

"2. *Longworth's Prolific.*—Early, large, and of excellent flavor; only moderately productive; sometimes running too much to leaf.

"3. *Hooker.*—Good size, of a rich, sweet flavor; moderately productive.

"4. *MacAvoy's Superior.*—Productive, large, and of excellent flavor; berries often defective in form.

"5. *Hovey's Seedling.*—This variety is too well known to need any description. Its only defect is dryness and want of high flavor.

"6. *Burr's New Pine.*—Of exquisite flavor, medium size, only moderately productive; plants want vigor and hardiness."

At Boston, the same season, the question was discussed by the Horticultural Society, and a ballot taken as to the best six varieties for market, which resulted as follows: Early Scarlet, 19 votes; Wilson's Albany, 19; Hooker, 11; Hovey, 10; Triomphe de Gand, 8; Burr's New Pine, 6; other varieties, 1 to 4 votes each.

Another ballot was taken for the best six varieties for amateurs, which resulted in the following list: Early Scarlet, Hooker, Burr's New Pine, Hovey's Seedling, Wilson's Albany, and Triomphe de Gand.

The same season R. G. Pardee, of New York, author of a book on strawberry culture, made a report to the Farmers' Club, naming six sorts most profitable for cultivation for market purposes, including Early Scarlet, Wilson's, Longworth's, Hovey's.

At the same time Dr. Ward, a successful cultivator near Newark, N. J., exhibited twenty-three varieties, and made the following statement:

"I will only speak briefly of some of the most prominent. The one much cultivated at Cincinnati, called the Iowa, is only good because it is very early. The Genesee seedling is without an equal for its beauty, and it is of a pleasant flavor.

"The MacAvoy's Superior is too soft for marketing and apt to rot, though fine-looking.

"Longworth's Prolific, which can be grown thirty-two to the pound, is a remarkably fine variety.

"The Wilson Seedling has one objection for field-culture—its heavy berries beat down to the earth and injure, unless the land is well mulched. It is a vigorous grower, and the most prolific of all, and is a good berry for transportation, as well as prolific.

"The Virginia Scarlet is the earliest of all varieties, but it is good only for a very early crop.

"The Monroe Scarlet grows in clusters, and is easily separated from the stalk, and good on that account.

"The Wyllie is much like the Monroe, but not easily separated.

"The Walker is an excellent berry, but too soft for market. Yet it is very rich when picked and eaten in the garden, and well worthy the attention of private families. It is an honest berry.

"The Crimson Cone is a great market berry, but too soft for transportation without injury.

"Burr's New Pine is the richest berry that we have. It bears rather shyly. It is not productive enough for a market-gardener's fruit, but should be in every garden.

"The Hovey Seedling is one that I can not dispense with; it is always satisfactory. The average is not very large, but very good, and bears carriage pretty well.

"The Boston Pine should always be grown by the side of the Hovey, both for a fertilizer and for its fruit.

"The Moyamensing Pine is a good late berry; valuable for preserving as sweetmeats.

"Young's Seedling, from Philadelphia, is nothing but a Hovey Seedling.

"A nameless berry, that originated on my place, has many good points; but I must not say too much about it. The excellence of the berry is, that in itself it is all that we want; it does not need sugar, has a fine aroma, is of good size, and is very hardy; the foot-stalk stands up well, so the fruit does not get dirty.

"The Peabody Seedling is not quite all that many expected by the *éclat* given to it by the original propagator, though a pretty good berry.

"For productiveness, or best pecuniarily, the strawberry for me is the Iowa; yet it is the least valuable fruit. I have never marketed Wilson's, but I think it will prove at least one of six most prolific of returns to the cultivator, if not quite the best. Longworth's Prolific and Hovey's are among the six. The seedling I have shown bids fair to be more profitable than anything that I have grown. It is my business to grow strawberries and other fruits to make money, and I can get three times as much for equal measure of Hovey's Seedlings as for the common market sorts."

As to productiveness and value of varieties, Dr. Ward said:

"The most productive strawberries that I grow are staminates or hermaphrodites, and I think that is the opinion of others.

"The following four varieties, in their order, are likely to prove most profitable to the market gardener: Wilson's Seedling; Iowa Strawberry; Early Scarlet, Virginia Scarlet or Scotch Runner; and Longworth's Prolific. These are what are called hermaphrodite, or staminates, and they are all great producers, and more so than any pistillates or any other that I ever grew.

"The Wilson Seedling has a perfect blossom, and is one of the most productive strawberries known; the fruit is pretty strongly acid. Many of the flowers of the wild strawberry are barren for want of other plants near them to furnish impregnating pollen, and that is the reason why we see such a show of blossoms some seasons in the fields, and so little fruit.

"Hovey's Seedling must have fertilizing plants set with it. Wilson's Seedling is a perfect plant, and fertilizes itself."

Mr. Knox, a large cultivator of strawberries near Pittsburg, after a trial of three years, previous to 1860, places at the head of the list of strawberries the Triomphe de Gand. He says:

"But little has yet been said about this variety, and it has not been generally cultivated, but as soon as well known it will be the most popular strawberry in the country. There is no known excellence which it does not possess. The plants are thrifty, hardy, and vigorous growers, bearing their fruit well up, which renders it easy to be kept clean. They are also wonderfully productive, and the fruit is not only usually of very large size, but uniformly so and throughout the season, which is longer with it than with most other varieties. The flavor is everything which could be desired. It is of a very beautiful crimson color, glossy, and altogether lovely. It keeps well after being picked, retaining its beautiful color and firmness, and carries better than any other variety."

He regards the Wilson's Albany as a very valuable and profitable variety, and has shown his faith in it by planting fifteen acres. In addition to its many other excellences, it has proved a superior berry for canning or preserving. Its weight, size, solidity, flavor, and color render it popular for this use.

Scott's Seedling is remarkably mild, combining a pleasant peach and strawberry taste, much liked, except by those who prefer very acid fruit. It is a conical, bright crimson berry, of fair size, with, generally, a cavity in the center—hermaphrodite.

"The true Bishop's Orange will be good for a late ripening crop, and is remarkable for its beautiful orange-scarlet color, and for its productiveness.

The Jenny Lind is very early, a good bearer, double the size of Early Scarlet, fine color, well flavored, productive, and a favorite in New England.

Peabody's Seedling is a very shy bearer, and is nowhere a favorite at the North.

Prince's Scarlet Magnate is a beautiful sort, and a rampant grower.

The Bartlett, said to be a new seedling, originating in Brooklyn, N. Y., is an excellent strawberry.

The pleasantest flavored strawberry grown is Burr's New Pine, and Swainstone's the richest, but these are not productive sorts.

The following is a description of the Austin, a seedling originated by the Watervliet Shakers:

Fruit large, roundish to conical, sometimes flat, occasionally necked, and uniformly with a large core; color light scarlet; seed brown, slightly imbedded; flesh white, rather soft and dry, acid, and somewhat deficient in flavor; calyx large, many-parted, and persistent; stem stout and erect; flowers staminate. It is said to be very productive, but the fruit is too soft for long transportation.

The Boyden Seedling is noted for its mild character, which is such that the most delicate invalids may use it with impunity. It grows to a large size, is a very delicious berry, but rather a shy bearer.

The White Alpine may be cultivated for variety and late fruit, but the berries are small, and the vines not productive.

We have made the following selection for our own use, all of which have their points of excellence, as grown in our garden for family use, to wit:

Wilson's Albany Seedling, the most prolific, and when its large berries are well ripened, not too acid. The trouble is, that servants will pick them before ripe, because they are red. They are so a full day before they are ripe.

Hooker's Seedling grows vigorously, and is productive, and fruit excellent; large size, and handsomer than the Wilson, which is very dark. This is one of the best for family use. It was originated in 1850 by H. E. Hooker, of Rochester.

The Bartlett, we believe will prove equal to either of the above for family use.

The Austin Seedling is likely to prove valuable for family use, because it is a later ripening sort than the others.

The Hovey is a very shy bearer in our garden. The Jenny Lind is not so promising as it is said to be in Massachusetts. MacAvoy's Superior is good for family use, but too tender for marketing, and so is Burr's New Pine, but is of high flavor, and requires high culture.

Prince's Eclipse, Scarlet Magnate, and Climax are all handsome sorts, and wonderfully vigorous growers.

The Boston Pine produces an excellent berry, round, deep crimson; very handsome.

The Genesee is a good-sized, long-necked berry, very mild, but not very excellent.

The British Queen is a high-flavored strawberry in England, where it is considered the standard of perfection. Fruit irregular shaped.

Longworth's Prolific, originated by the celebrated Nicholas Longworth, of Cincinnati, is an excellent family berry.

The Peabody strawberry, originated by Chas. A. Peabody, of Columbus, Ga., and sold by him at a high price, is not worth as much for cultivation with us as several other sorts.

Rivers' Eliza, an English sort, has the highest reputation of the imported varieties. The fruit is large, rich, and juicy, but the plants do not stand our hot dry weather very well.

The Red Alpine, a native of the Alps, will produce an autumn crop if the spring blossoms are cut off.

Scott's Seedling grows one of the handsomest strawberries of the family; it is very bright crimson, large, conical form, and pretty; high flavored.

Besides these, we have one called Chili, which we can give a high recommendation. These make up a fine assortment, but we can not advise farmers generally to try to cultivate more than three or four good sorts, embracing an early, medium, and late ripening kind.

609. **Seedling Strawberries.**—Seeing what wonderful improvements have been made within a few years, every one who can devote attention to it should continue the effort to obtain a still better seedling than has yet been produced. We shall hope on till some enthusiast gets a seedling as large and prolific as the Wilson, and as high flavored as the Swainstone, British Queen, Rivers' Eliza, Boston Pine, or any other. In 1861, Andrew S. Fuller, a skillful horticulturist of Brooklyn, N. Y., and an enthusiast in pursuit of seedlings, had over a hundred new ones, all of which were good, grown from the seed of the Wilson, Hovey, Peabody, and some other large sorts, and twenty-seven of them were selected by a committee of horticulturists as fully worthy of further trial on account of their many excellent qualities.

In 1862 the same committee made repeated examinations of these seedlings while in bearing, and finally selected three sorts, which we believe, and so do many persons who tested them and saw their growth and productiveness, make up as good an assortment as it is possible to obtain for family use. All are hermaphrodite plants; rank growers; very prolific; berries of large size and good color; one of them remarkably handsome. One ripens early, one late, and one between, so as to give ripe fruit throughout several weeks.

These new seedlings will become universally known as the Tribune Prize Strawberries, having been purchased by the New York Tribune Association for $3,000, with the design to send plants to all of its subscribers. They will probably be known hereafter as the "Colonel Ellsworth," which is the earliest; the Monitor or Tribune Mammoth, which is the next ripe; and the Brooklyn Scarlet, which is one of the handsomest strawberries ever produced.

This great sale of seedlings should encourage others to produce them. Take ripe berries and mash them with sand, and thoroughly mix and sow the sand and seed in carefully prepared beds. The seed-bed must be made in a shady spot, and kept well watered. When the plants are large enough, they are transplanted to the bearing-beds, and the runners carefully cut off. When the plants fruit, if one is promising, remove it to the trial bed, where it can remain fruiting two or three years.

Mr. Fuller carefully hybridized by hand all the blossoms of the plants from which he obtained his seedlings.

610. **Product of Strawberries per Acre.**—The following statement (1861) from a strawberry-grower in Delaware tells how many berries were produced as a first crop, and shows that what has been done may be done again, not by one, but by many who will pursue the same course. He says:

"The soil is sandy loam, with a subsoil composed of clay and sand in nearly equal parts. In January, 1859, the ground was plowed to the depth of eight or ten inches, turning under a timothy sod three years old, and subsoiled ten or twelve inches deeper, so that every part of the soil and subsoil was loosened to the depth of eighteen to twenty inches. In April, 1859, I plowed under a heavy dressing of stable manure, harrowed and raked the ground until it was well pulverized, removed all the grass, and after giving a top dressing of twelve bushels of unleached ashes, set out Wilson's Albany Seedling strawberry plants in rows three feet apart and one foot between the plants in the row. The bed had two hoeings before the runners commenced to grow, and afterward was kept free from weeds by the hand. This constitutes the great expense of cultivating strawberries upon an extensive scale, as it is essential to the production of large crops for successive years that the plants shall not be smothered nor the ground exhausted by the production of weeds. No protection was furnished to the bed during the winter. This spring the ground was almost entirely covered with plants, and permitted to remain undisturbed, with the exception of the necessary weeding. The bed blossomed early and very freely. On May 27 the first quart of berries was picked, and the bed continued to yield until June 16. Every care has been taken to keep an accurate account of the quantity gathered, and the yield has been 880 plants, making 9,050 quarts, or 282 bushels to the acre. The number of berries growing and manuring upon single plants was frequently over 200, and in several instances 300 were counted upon a plant. The berries were large and fine looking, those first sent to Wilmington selling for 25 cents a quart at a time when the common variety was bringing only 10 cents. Having other beds for my own consumption, all the berries from this bed were sold for $116 14, from which, deducting $21 98 for commission, freight, and picking, leaves $94 16 as the net return from less than one tenth of one acre of ground. This variety possesses all the requisites of a market berry, being large, handsome, and very firm, meeting with a ready sale, and yielding, under equal circumstances, as great a number of bushels to the acre as can be obtained from the cultivation of the potato. I am confident that a greater yield can be obtained by cutting paths one foot in width between the rows, as originally planted, thus dividing the plantation into beds two feet in width, so that the vines can receive more air and light, and the berries be gathered without trampling upon the plants."

611. **Staminate, Pistillate, and Hermaphrodite Blossoms.**—It appears to be a settled question that there are three distinct forms among the blossoms of

strawberries, and that two of them will not produce fruit except by impregnation one with the other. These are called male and female flowers, the male flower growing stamens without pistils, and the female flower pistils without stamens. The other, called hermaphrodite, is furnished with both, and has the power of self-fertilization in each blossom. The female, or pistillate flower, has a golden center, the pistils covering it like short stiff hairs. The male, or staminate flower, has a dark center, from which grow a dozen or more stamens, which are little stems with knobs on the ends, which bear the pollen that must come in contact with the pistils to fructify them, or else the plants will be barren of fruit. Some plants bear all staminate and some all pistillate flowers, and where that is the case, unless the two sorts grow in proximity, both will be nearly destitute of berries.

It is often observed that strawberry blossoms are abundant in the fields, and fruit scarce. This is owing to the sexuality of flowers, and the lack of favorable circumstances to produce impregnation. The great scarcity of bees in many of the old States cuts off the agencies by which nature carries on the work of fecundation of flowers.

Some varieties of strawberries always produce hermaphrodite flowers, the center of which is like the pistillate, with stamens growing out of it, as they do from the center of the staminate flower. This kind of blossoms will produce fruit if there should be no other sort growing near.

Although a pistillate variety will not produce without the aid of staminates, if the two kinds are set together the staminates soon outgrow the others, and so take possession of the ground, that in three or four years the bed affords but a meagre supply of fruit. Great care, therefore, must be used in cultivating strawberries not to let the barren, rapid-growing, male plants overpower the female ones, which are the true fruit-bearers.

612. **Soil—Preparation and Cultivation for Strawberries.**—The best soil is that lately in forest, of a gravelly-loam character, situated on a gentle southeastern slope, and should be underdrained, spade-trenched, or deeply subsoiled, and made rich and mellow before setting the plants. If underdrained thoroughly it will soon pay the cost in extra productiveness. If possible, protect the north and west sides by high fences or hedge. The best manure is woods-mold, and unleached ashes, and what is known as the "lime and salt mixture"—that is, a bushel of salt in just water enough to dissolve it, and that used to slake three bushels of lime; shell-lime is best. If land is parched with drouth, without artificial watering the fruit will be deficient, though all other requisites are complete. All the fertilizers should be mixed in the soil before the plants are set. Twenty or thirty bushels of ashes, three bushels of salt, and nine of lime may be used up on an acre, and the more the soil is stirred in its preparation the better; and it should be as free of weeds and grass as possible.

When ready to set your plants, rake the bed smooth and mark off the rows, and procure strong-rooted plants, and dip the roots as you proceed in water, thick with rich earth or compost, and set them no deeper than they naturally stood, being careful to cover with fine earth well pressed.

If you intend your bed to cover all the earth, set the plants a foot apart each way. If to be kept in hills, two feet apart. If in rows, make them three feet apart, and the plants eight to twelve inches apart in the rows.

There is no wrong season, when the plants are not bearing, to transplant strawberries. Perhaps the best time is after the old roots send out runners, and the first of them get well rooted. Then cut the connection with the old stool, and keep the new root from sending out runners until it becomes a strong root, and then, if your new bed is to be made in the same locality, take up the plants with a transplanting-trowel, with all the dirt that will adhere, and lay them on boards and carry right to the spot where they are to be set, and put them in suitable holes scooped out with the trowel or hand, and they will keep on growing almost as freely as though they had not been removed. Keep the ground free of weeds, and frequently stirred between the plants, till winter, and then cover with forest leaves, held in place by brush or a little dirt scattered over. In the spring, rake the leaves off the plants, and leave them as a mulch between. After fruiting, the runners begin to put out. If your plan is to keep distinct hills, cut off all runners every week. If your plan is for rows, keep working between the rows, and turn the runners so as to form a growth of plants a foot wide, leaving a space for working two feet wide between. This is the best plan for field-culture, working the beds by horse-hoe. When the rows get grassy, and need changing, run the subsoil-plow deeply and repeatedly through the rows, and work in the necessary fertilizers, and prepare a new row of plants by setting or training runners to the right spots, and let them set themselves, cutting away all the surplus ones. Then, late in the fall, the old row is to be completely turned under by the spade or plow, and so this renewal system may be continued, turning down a portion of the old bed each year, and thus having vigorous plants always in full bearing.

Where the plants are set with the design of covering all the surface, the runners are permitted to spread where they will the first year, and the second year the poorest plants, old or young, should be cut out, so as not to allow the bed to become matted. When it begins to fail, from being overrun with weeds or grass, or from the plants becoming feeble from age or want of room, divide it into strips two feet wide, and turn under alternate ones, and fertilize the ground for a new setting of plants to spread over it from runners; and when they are well established, turn over the other strips in the same way, and so continue. At every new preparation of the bed add ashes if you can, or bone-dust, or superphosphate of lime, or fine compost, in which rotted sods, leaves, and woods-mold hold the greatest share, and then no other manuring will be necessary while the plants are in bearing except the mulching of leaves, straw, or salt hay, that you should give every winter. Where it can be had conveniently, always get spent tan-bark for mulching. Turners' chips are a very good substitute, and so are leather shavings. When any fine material is used for mulching, be careful not to smother the plants. Sawdust, and also scrapings from the wood-pile, may be used if care is had about smothering.

Covering the ground permanently with saw-log slabs has been practiced with pleasing success. The plants were set in well-prepared soil, in straight rows one foot apart, and then slabs notched on the edge about three inches deep were fitted to the plants, so that they grew in bunches in holes about six inches wide, and of course free from weeds and grass. By this plan no new plants are made from runners; so, if such are desired, a bed must be kept for that purpose. The old stools of strawberry plants, after a few years, grow so much above the surface that they are not productive. Hence the necessity of frequent renewals.

Some Long Island market gardeners set the plants so as to work between the rows with a horse cultivator the first season, keeping the ground clean until the runners begin to take root. Next season the field produces one heavy crop, when the weeds are allowed to grow a few weeks, and vines and all are then plowed under, and a new plantation started.

Never set the plants any deeper than they originally stood. Although we should always prefer new plants, yet it may be remembered that the act of transplanting old roots, even those that have become barren, causes them to send out new bearing crowns, and so become fruitful again. It is also recommended, by those who have proved its value, to hill up old stools with fresh earth, which has the effect to make them fruitful again.

Watering in a dry time is highly important. It will keep the plants in bearing twice as long as without it. Charles A. Peabody, near Columbus, Ga., has certainly been one of the most successful strawberry culturists in this country. He has carried berries to market more than six months of the year, and he obtained them by copious watering with a movable pump —a garden engine. He planted his beds upon sandy land, newly cleared of pine and oak timber, choosing a flat near a little brook, on account of convenience of water. He used no other fertilizer at first than what was obtained by burning the timber and brush and scattering the ashes, and afterward by mulching with forest leaves. After the fruit season, his practice was for a hand to go through with a hoe and cut up the poorest-looking plants, so as to keep them from getting too thick, and then the mulch being put on, prevents the runners from setting, and they are afterward cut away. He is careful to have all the vines cut off left on the ground, considering them the best kind of fertilizers. This is true in regard to all kinds of plants; the ashes are the best kind of manure for the same kind growing

613. **Raspberries.**—This delicious fruit has not yet reached the perfection that strawberries have. We regard the strawberry as the chief of the small fruits, from its being the earliest fruit to come into bearing after planting, its cosmopolitan character, its enormous productiveness, ease of culture and reliability, and last, though not least, its delicious qualities; and we regard the best of our cultivated raspberries nearly equal, but unfortunately the

plants are not hardy. It is perplexing to a farmer, and so it is to any one but a professional gardener, to have to look after the raspberry plants, and carefully cover them before winter sets in. We need a new raspberry, as delicious as Fastolf or Brincklé's Orange, and hardy as the Black Cap, or wild red sort which produces so abundantly in Vermont and Canada. To this end we must undoubtedly look to the native seedlings principally to obtain the hardiness and vigor of constitution necessary to enable the canes to withstand our winters, if possible, without injury.

Many seedlings have been introduced, but they are mostly direct descendants of European kinds, and have not generally proved much hardier than their parents; and like them in that and some other respects, have not grown generally popular or given entire satisfaction. We do not despair of seeing a new raspberry that will have all the good qualities desired.

E. C. Clark, of New Haven, has shown specimens of a new seedling raspberry which promises to be an acquisition of considerable value to fruit-growers. It is stated as being hardy for out-door culture, red color, and certainly a very good flavor and fair size, and sufficiently hard to bear transportation.

Lewis F. Allen, of Black Rock, N. Y., has distributed a raspberry that promises good results, and by some is very highly approved.

H. H. Doolittle, of Oak's Corners, Ontario County, N. Y., thinks he has improved the Black Cap raspberry so as to get the good qualities we have mentioned. He says the bushes are as hardy as the wild sort, and he is well backed by certificates of good men that they bear abundantly, and that the fruit is rich, and that it bears transportation perfectly.

The Catawissa raspberry is called an ever-bearing sort, but is not more so than the Belle de Fontenay, though it may be a little more hardy. It is objected to by those who wish to increase the plants, that it does not throw off sufficient offshoots.

The Kirtland raspberry has received some high commendations in Ohio, ripening its fruit in June, and continuing to produce rich red berries abundantly for three weeks.

R. G. Pardee, in speaking of this variety of fruit, says: "Most of the plants sold for pure Antwerp raspberries are poor things, and, in fact, we have but very few sorts of raspberries worthy of cultivation that are hardy. Brincklé's Orange is about the best light-colored sort cultivated, but that is not quite hardy. The Belle de Fontenay is highly esteemed, but that nor no other can be truly called 'ever-bearing.' The only way to get a full crop in autumn is to cut away all the canes in May; that throws the strength of the whole root into the new canes. The Belle and the Four Seasons, and perhaps some other of the ever-bearing sorts, will produce a good fall crop with this treatment. I believe the Fastolf the best family raspberry that we have."

614. **Blackberries.**—There is but one variety of blackberries extensively cultivated, and that is known as the "Lawton," or "New Rochelle Black-

berry;" and it is truly a most magnificent fruit, and productive beyond belief. We are fully satisfied that it is as hardy with us as the native blackberry, the thermometer having been several times below zero, our unprotected vines have sustained no injury. Its universal productiveness is undoubted by all who have seen mature plants in full bearing. The size of the fruit exceeds any other sort, and when suffered to remain on the vines till fully ripe, it is not too acid, which is the only fault we ever heard charged against it. These berries often appear fully ripe to an unpracticed eye, yet are really unfit to eat. When perfectly ripe, the berries lose the shining appearance, and if tickled a little will fall into the hand.

The New Rochelle blackberry originated in the town which it is named after, about twenty miles northeast of New York city. It is either an accidental seedling of the wild variety, or else a sort brought there by the French Huguenots, who settled that place. It was discovered growing wild by a Mr. Secor, from whom William Lawton, who lived in the village of New Rochelle, obtained his first plants, and began their propagation, though slowly, because he lacked the skill of a professed nurseryman.

George Seymour & Co., of Norwalk, Ct., nurserymen, obtained some plants about the same time, and went to work skillfully to increase their stock before advertising the wonders of the new berry to the world. In the mean time Mr. Lawton made a show of the fruit, and the enormously thrifty growth of the plant, before the American Institute Farmers' Club, which was given to understand, from his statement, that it was a seedling originated by him, and thereupon it was named the "Lawton Blackberry." Others, knowing that he did not originate it, have insisted that he was not entitled to the name, and call it the "New Rochelle Blackberry." By either name the fruit is the same, and is well worthy of cultivation. The bush is one of the rankest-growing ones of the *rubus* family, and bears enormous crops. We have counted over a thousand berries on a single cane, and know that a hundred bushels have often been picked from an acre. The berries are in perfection the middle of August, and the common selling price in New York for some years was twenty-five cents a quart, and when the wholesale price fell to ten or twelve cents, some of the largest growers would not sell them, preferring to squeeze out the juice and convert it into wine or cordial.

The quality of the berries is that of a very juicy pulp, much larger in proportion to the seed and hard core than in the very best wild sorts, and the berries grow to nearly double the size, of roundish form, about an inch long, more resembling the running variety than any of the berries of the wild high vines.

The plants endure the coldest weather without any protection, and will grow upon any rich soil and bear any amount of manure.

615. **How to Plant and Cultivate the Lawton Blackberries.**—If the plants are taken from the ground and planted while the roots are fresh, they will all live. If suffered to get dry, the most of them will die. Even one hour of exposure to the sun or drying wind is apt to prove fatal. If they are

put up by nurserymen in good order, they will bear transportation well. When the package is opened, bury the roots immediately in fresh earth, and draw them out only when ready to set immediately in their places. Under no circumstances must the roots be exposed long enough to get dry, nor drenched with frequent waterings after being set, nor must you expect them to grow in poor soil without manure. The whole *rubus* family are gross feeders, and none more so than the Lawton blackberry.

For a garden plat, lay out a bed from four to six feet wide, near a fence or any other convenient place; spade the ground from sixteen to twenty inches deep; if the subsoil is gravel, throw it out and put good soil in its place. Distance should be from six to eight feet apart. The stems of the plants should be cut down to six inches. Plant the roots about three to six inches deep; when planted in autumn, cover with straw, mulch, or litter, which remove in the spring.

Allow but two canes to grow from each root the first summer; these will produce fruit the second summer. At the same time other shoots will make their appearance, preparatory to bearing the ensuing season, and but two of these should be allowed to grow—consequently there will be two growing and two bearing canes to each root every season—the latter will die in the fall and should then be removed.

It is no trifling job to trim up a lot of these plants as they should be, and no one should attempt it without being suitably dressed with stout cloth—a kind of duck, such as sailors wear, is the best—and leather mittens.

If you wish to set out a field of blackberries, manure the ground as you would for a crop of corn, plow deep and harrow well, then run furrows eight feet apart; cross-mark same distance apart with a chain or other instrument, giving eight feet each way between the plants—some cultivators recommend ten feet each way—set about six inches deep, and only one plant to the hill.

The vines or canes will, the first year, take rather a low or trailing form; these should be shortened in a little in the spring; then cover the ground with old straw or litter under them, after putting the ground in order, letting the fruit rest upon the mulch, which keeps it clean from the ground.

The next, or second year, the plant takes an upright form, throwing up two, three, and sometimes four large shoots.

Plow and cultivate freely but shallow, using plow and cultivator two or three times the fore part of the season, keeping down all weeds and the ground in fine tilth, after which mulching with salt-hay, straw, seaweed, or anything that can be got hold of, will be found of special value, keeping the ground moist and friable, and the fruit clean.

When about four and a half feet high, prune by pinching out or cutting off the buds of the leading shoots, which will cause the side-shoots to start and make stouter and better bearing plants.

After pruning, stake the plants, tying them in an inclined position, because if trained upright the side-branches are apt to break down from the weight of the fruit.

The above are the directions given by Mr. Seymour, who had five acres in full bearing when we saw and made a careful examination of them some years ago. On the first half acre planted we found ten rows, of thirty-two bunches each, making 320 roots as originally set upon the half acre. The lowest estimate of any of the gentlemen present was five quarts of berries to a bunch of roots. That would make five bushels to the row, and fifty bushels to the half acre. Knowing that it takes only an average of 120 berries to a quart, from rough calculation of numbers we are satisfied the average will be eight quarts to the bunch. But let us take the lowest estimate, one hundred bushels per acre, and we have a crop worth eight hundred dollars, at the then wholesale price of twenty-five cents a quart. And even at only one fourth that price the crop would be a good one. Mr. Lawton's method of pruning his plants consists in carefully heading back all the branches to the fully-ripened wood. In some cases half of the length of the plant is cut away—generally about one third of the length. Then all the fruit comes in perfection. Commence to head back with the plants the first year of bearing, when 200 to 250 berries may be expected from each plant, as it branches out very full of bearing limbs.

616. **The Dorchester Blackberries.**—Since the successful introduction of the New Rochelle blackberry, several attempts have been made to bring others, possessing some peculiarity, into notice. Among these the best and most successful is one called the Dorchester blackberry, originating in the town of that name in Massachusetts, and first brought into notice by Capt. Lovet, of Beverly; it is a sweet, excellent fruit, and by many persons in that State is much more preferred than the Lawton, which does not ripen as well in the vicinity of Boston as it does at New York.

617. **The Thornless Blackberry** originated, or at least was brought into notice by Jonas Newman, in Ulster County, N. Y., where it is said to be remarkably prolific. If so, it loses its character whenever removed far from its original locality. The fruit is sweeter than the New Rochelle variety, and it is much easier gathered on account of the partially thornless character of the plants; but they are very shy bearers in every locality where we have seen or heard of their cultivation east of the Hudson.

618. **White Blackberries,** if such a misnomer may be allowed, are among the novelties of the day, or rather among the old things which are every now and then brought forward as novelties. The berries are of a dirty white color, of an insipid sweet taste, having no distinct character either sweet or sour. We would not, even for the novelty, give them garden-room.

619. **The Parsley-Leafed Blackberry** is an old variety, which is every now and then brought forward as something new. It is unlike the Lawton in this particular, that it does not bear pruning, and its long, climbing vines must be trained upon trellis-work to produce well. It is valuable to use as

a covering of unsightly walls or rocks, and may be grown on a trellis or rock-work to good advantage, as its foliage is very ornamental and the fruit delicious.

620. **The Cut-Leaf Blackberry,** we think, is the same as the Parsley-leaf variety, being called differently in different places.

There are two sorts known as "Double White Blossomed" and "Double Pink-Blossomed," used for ornamental purposes, and for that are really pretty adjuncts to landscape-gardening. But the most ornamental blackberry that we have ever seen, is a new variety which we first saw in the garden of Andrew S. Fuller, Brooklyn. The whole stem is of delicate pale-green color, and the foliage is very pretty.

621. **The Running or Trailing Blackberry** has been lately cultivated with great success, and as much improved in quality, size, and productiveness as any other wild fruit by cultivation and rich manuring. It will grow upon very poor land if manured, and particularly delights in old stone walls, rocks, stumps, or fence rows, and might be made particularly useful upon many places where rocks abound, as they do in New England, New York, New Jersey, and Pennsylvania. On Long Island, the running blackberry is one of the most valuable crops that many farms produce. The business of picking and sending to market has been systematized by Joseph French, whose name is worthy of mention as a benefactor to that region. Much of the land from which Long Island blackberries are gathered is very sandy, and almost barren, having been turned out to common as too poor for longer cultivation. But since picking blackberries has become a business, some farmers have allowed cornfields to grow up along the rows, and continued plowing between, and in some cases using manure, which has made the berries double the size of wild ones.

We recommend growing a plot of running blackberries in every farm garden where this variety grows naturally.

622. **Value of Blackberries for Wine.**—Besides the object of raising blackberries for the fruit to eat or sell, there is another of equal importance. A very palatable wine or cordial can be made, which, if sold at the usual rates, will make the crop a very profitable one; for the juice of 80 quarts of Lawton blackberries, with 90 pounds of double-refined sugar, will make a barrel of wine, such as has commanded $2 a gallon, for several years, in New York. Now if we count the wine at a wholesale price of only $1 a gallon, and reduce the price of berries, the following would be something like the items of cost of wine: 2½ bushels (80 quarts) of berries, for a barrel, at 6¼ cents, $5; 90 pounds of sugar, at 11½ cents, $10 35; crushing and mixing, 65 cents; cost per barrel, $16.

The product of wine per acre, yielding 100 bushels of berries, would be 40 barrels, costing, exclusive of berries, $11 a barrel, and selling, at $1 per gallon, for $1,200. Upon this calculation, will the market ever be glutted, or will the crop, which costs no more than a crop of corn, exclusive of the picking, ever cease to be remunerating?

There is another thing in this connection. We have, we do, we shall send Ohio whisky to France, to be run through the stills upon the lees of the wine-press, which we buy back at a high price under the name of brandy. From blackberry wine we can make a very superior brandy at less cost and far more fit for medicinal purposes. We can also make blackberry sirup, if we have the fruit in abundance, that will cure all the summer complaints in the community, and save the lives of an army of children every year.

For sirup, no water is added to the juice and sugar; for wine, after the sugar is well dissolved by frequent shaking of the barrel, it is filled up with water and allowed to ferment, and then treated as all domestic wine should be. [See 469 to 476.]

623. **Gooseberries.**—There are about a dozen sorts of gooseberries in common use, the most of them English; and however much they may be preferred, we have to say that the English varieties of the gooseberry have never succeeded in this country, only in a few localities, and we doubt if they ever will. Indeed, there is no place on the Eastern Continent where the gooseberry has been brought to the perfection that it has in England. In Italy, where it is found in its wild state, it has never received extensive cultivation, or thought worthy of it. In Spain it is scarcely known; in France it is but little esteemed; and in no country does it thrive so well as in the humid atmosphere of England. And it is to this perfect adaptation of the climate to the plant that the great improvement of this fruit is owing more than to the skill of the cultivator. In Holland and some parts of Germany it is cultivated with success, having a climate milder than that of England, with much of its humidity. To succeed here with gooseberries, we must plant them upon soil that is cool and moist, on the north side of a hill, or a cool and half-shady place, and then keep the bushes properly pruned; for under such circumstances we have seen abundant and regular crops for years in succession. If cultivators would take indigenous varieties, of which there are some twenty, and many of them superior to the native European variety, and sow the seed, and by so doing improve the fruit, we should soon have varieties that would be equal, if not superior, to any imported variety. Besides being native, they would be exempt from those diseases which we have to contend with in the cultivation of the foreign kinds.

The Shakers of New Lebanon, N. Y., have a gooseberry, called the "Mountain Seedling," that is very hardy, and of fair size and quality, that was found growing wild in that vicinity.

You must not entertain the idea that you will get an improved variety of fruit by purchasing sorts which have given remarkable results from very high cultivation. The currant will grow and produce fruit in almost any locality, badly neglected; but the gooseberry will not grow in that way. We know that the English gooseberry has failed in most places under ordinary cultivation. But we have some very good native gooseberries that are perfectly hardy, and some of these have been greatly improved; and we hope others will be, until we have a native gooseberry as hardy as the wild one, and as good as the best English ones, which are all seedlings from wild sorts, common in Piedmont and France. The Houghton Seedling appears to be the favorite sort at present.

The Houghton is a large, fine berry for marketing, but is not so delicate in texture nor excellent in flavor as some of the English sorts. We have seen a seedling variety that originated on Staten Island, that had grown several years free from mildew, and appeared very promising. Some persons think the most delicate kinds can be grown upon "the renewal system"—that is, never suffer old wood to remain. Others say that if grown upon a clay soil, and no heating manures ever used, and the ground mulched with salt-hay or its equivalent, all the English varieties of the gooseberry can be grown in our climate as well as in England. Perhaps. As a general rule, the red varieties appear the most hardy.

We believe that good cultivation and care will enable any one in almost any locality to grow good gooseberries free from mildew. But we do not believe that farmers in general will bestow that care. If any one will, it is not necessary, perhaps, for us to resort to the native sorts, but we may at once procure the very choicest English varieties, like some of the beautiful specimens exhibited at every fruit show.

We will give the names of a few of the leading sorts of gooseberries cultivated by gardeners and amateurs: Sheba Queen, Champagne Red, Champagne Yellow, Whitesmith, Golden Drop, Keen Seedling, Green Gage, Crown Bob; the first and last of the list are the most popular. The "Mountain Seedling" should be added to the list.

624. **Quinces.**—Although quinces can not properly be ranked among the "small fruits of the garden," we will introduce them here because they more properly belong to the garden than to the orchard. They should belong to every garden, because they are excellent fruit, always acceptable for family use, or salable at a liberal price in market. The tree is very hardy, and grows from four to twenty feet high while in good bearing condition. We have known them set by the side of a garden wall and stand there neglected for thirty years, producing a crop every year. They will, however, pay for better treatment. If set in clumps in a lawn and kindly cared for, they are highly ornamental. The main stem of a young quince bush should be cut back at a year old, and then it will form several branches, with curious crooked limbs, and it may be trimmed to form a bushy head of almost any shape. The form, foliage, flowers, and fruit are all ornamental. This plant is a bush rather than a tree, and comes to us from Cydon, in Crete, its botanical name being *Cydonia vulgaris.* It grows best in moist, or rather mucky soil, by the side of rivulets, or streams, or ponds; but it should not be neglected as it is generally, unless knotty, miserable, bitter, sour fruit is preferred to the fair, smooth, high-flavored fruit produced by cultivation. No tree or shrub pays better for manuring than the quince. It is true, after its form is once established, it needs but little care in the way of pruning, and if located in a favorable situation, does really flourish without care.

But we are sure that a quince orchard would pay for care as well as one of peaches. The variety called the Apple quince is very productive, and the fruit, though it is unfit to eat out of hand like pears, apples, peaches, is always salable, for it is universally esteemed for sweetmeats, jellies, marmalade, etc., and for adding piquancy and a delicious flavor and aroma to apple tarts, pastry, and stewed fruit. The quince can be easily dried either raw or cooked, and is then excellent to add to other fruit. In England, wine has been made of quinces, and it is esteemed a valuable medicine by asthmatics.

It is very easy to extend the cultivation of quinces to any desirable point, and the plants are generally true to the seed, and if not, seldom produce a worthless sort. They also grow from cuttings set early in the spring in a rich shaded border, where they may be put in as thick as hair until roots start, and then set in a nursery bed. The poorer stocks can also be budded with good sorts, and they have frequently been grown by budding upon thorns. Quince stocks for the propagators of dwarf pears, are indispensable.

625. **Varieties of Quinces.**—In purchasing quinces, do not suppose that there is a large variety of sorts because you find a great number of names in the nursery catalogues. There are just three distinct varieties: the Apple-shaped, or Orange quince; the Pear-shaped, or oblong quince; and the Portugal quince. The fruit of the last is considered superior to cook, and it is occasionally mild enough to eat out of hand. The leaf is larger and broader than the common sort, and the tree grows strong and bears large fruit of oblong shape, of rather light-colored skin, but the flesh, when cooked, turns to a fine purple. This variety would be more esteemed if it was not such a shy bearer.

Rea's Seedling is the name given to one of the quince family, the fruit growing very large and handsome in color, shape, and general appearance like the Orange quince.

626. **Ornamental Quinces.**—The Japan quince is more for ornament than use. The blossoms are handsome, of bright scarlet color, and the fruit green, hard, and useless.

The Chinese quince is of the same character as the Japan, an ornamental shrub—nothing more.

In conclusion, we will say of the quince in general terms, it is one of the very best fruits for preserves, marmalades, sauces, sirups, jellies, either alone or with other fruits, to which it imparts its fine flavor. The liquid, after washing the mashed fruit with water, and standing for twenty-four hours, makes a good wine with sugar. Medicinally, the quince is strengthening, giving tone to the stomach. Baked with sugar, they are superior to apples, and dried quinces are frequently mixed with apples, in making pies, to improve their flavor

PLATE XVI.

(Page 555.)

THIS is a fitting frontispiece to this important chapter upon the orchard. It is indeed "a dessert fit for a farmer." It is placed here as a sign of something good in the following pages. It is made tempting in its appearance to tempt you to taste of what is said of fruit culture. The basket is a symbol of what every farm should be—overflowing with its abundance of choice, rich, luscious fruits. Its place by the side of the wall is suggestive. Fruit needs protection. The view of water behind the wall is symbolical. A situation near water, if the soil is dry, is favorable for fruit-growing. The scene beyond is that of the quiet country home, where six days of labor and one of rest and thanksgiving in the village church shall bring a store of just such fruits as are here exhibited. Reader, look at this picture! study its lessons, thank God, and enjoy the fruits of the orchard.

A Dessert Fit For A Farmer.

CHAPTER VI.

THE ORCHARD.

SECTION XXXV.—PROPAGATION, PLANTING, AND CULTIVATION OF TREES.

IT will not be expected that we shall give a complete treatise upon so important a subject as the title of this section indicates in the space allotted to each subject in this work. We only aim to brief hints, just enough to awaken attention and induce farmers to procure and study some of the many valuable works easily attainable, such as "Downing's Fruits and Fruit-Trees of America," "Kenrick's New American Orchardist," now somewhat old, but full of useful information; also "Cole's Fruit-Book," a pocket edition; "Manning's New England Fruit-Book;" "Elliott's American Fruit-Growers' Guide;" "Barry's Fruit-Garden;" "Waring's Fruit-Growers' Hand-Book;" and "Thomas' American Fruit Culturist." All are modern and standard works, of small size and cost, having a great mass of valuable information condensed into such brief space that the busiest man can find time to read them, and to study carefully such parts as are directly adapted to the particular case in hand. Many of the nurserymen give valuable information in their annual catalogues. This is particularly the case with Dr. Grant's catalogue of grapevines. It gives the most information about grape culture of any work we are acquainted with. Some of the agricultural and horticultural papers, which are published so very cheap that every farmer can afford to have one or more always upon his sitting-room table, often contain single items about fruit culture worth ten times the cost of annual subscription.

The annual reports of transactions by the American Pomological Society, as well as those of other societies, should be in the hands of all persons who have any interest in fruit growing. Then to such as can afford the cost or time of study, the publications of London and Paris will give a world of information upon this subject. Some of them have most expensive colored plates, such as no American publisher has dared to rival, though we have had a few feeble imitations. "Field's Pear Culturist," with colored fruit, though inferior to Paris works, yet contains some valuable information. Those who are able should possess "Lindley's Guide to the Orchard and Kitchen Garden," which, although published thirty years ago, and adapted to England, contains much valuable information for American farmers, and also all of Lindley & Loudon's works; and many others, both English and American; and we hope that this chapter will contain a little, if but a little, that will be valuable.

One of the most thrifty orchards we know of was planted by an old sea-captain, who took reason rather than practice for his guide. He made but one error—he used trees too large, such as fail nine times in ten. He first plowed and subsoiled his orchard ground nearly two feet deep; then he dug holes eight feet across, two and a half feet deep, and filled them all with surface soil, scattering that dug from the bottom in place of that taken from the surface between the rows. Then he went to the nursery and dug his own trees, or at least directed every stroke, and brought them home in his own wagon and planted them with his own hands, straightening out and carefully bedding all the roots just as deep as they originally grew, and then mulched, and kept mulched for two years, the whole space occupied by the roots. In six years he had a productive orchard of apples, pears, and peaches, and in eight years it was one of great notoriety for its vigor and fruitfulness.

The following-named trees are transplantable in the order in which they stand, as to the success attending their removal, viz.: plums, quinces, apples, pears, peaches, nectarines, apricots, cherries. Yet we have successfully removed choice cherry-trees of six inches diameter.

Make it a rule never to occupy the ground of an old orchard with new trees. In the first place, you can not properly plow the ground, on account of roots; and secondly, if you could, the trees will not grow as thriftily.

The aspect of land for an orchard in a hilly country is a matter of some importance. The most natural one for the growth of trees appears to be a hillside, facing the southeast; but it has been found that some trees, liable to injury from spring frosts, are more apt to be affected upon such an aspect, because the morning sun strikes the trees earlier than upon other aspects; so, many farmers, of late, have planted trees on the side of a hill facing the north. But there is then danger from the extreme cold of winter, as it has been pretty well ascertained that a sudden turn from mild winter weather to twenty degrees below zero is fatal to peach-buds, and dangerous to buds of other fruit-trees; and there is sometimes danger that a northern exposure will not perfectly ripen the fruit of some trees. Upon the whole, we would compromise the matter by selecting a hillside with a southwestern aspect. South of New York, northerly slopes may be more safely selected, and as far south as Washington would be generally preferable; and by the same rule, as far north as the middle of Vermont, the southern slopes will always be found the safest.

627. **Roots—Their Function, and the Effect of Soil.**—The function of the roots of a tree are not merely, as some persons suppose, to give it a hold upon the ground, to support it in its place, but to feed it as really as an animal is fed. The many spongioles at the extremity of the fibrous roots are its

mouths. These, as the name indicates, are little sponges that suck up and carry into the circulation any substance that presents itself in a liquid form; and manure, until it assumes that form, is as useless to plants as sticks or stones, and it can not become liquid until it is thoroughly decomposed; hence the value of composting all coarse manurial substances before applying them as fertilizers. Hence, too, the advantage of deep tilth, that these spongioles may go in search of food. Let it be remembered, when we think about the flinty character of the outside coat of stalks of wheat, rye, corn, and some of the "sickle-edge" grasses, that this all comes from quartz held in solution, having been dissolved by alkaline substances furnished by the decomposition of vegetable matter that affords potash, or from some other source, and that this liquid flint has been sucked up through these little rootlets and carried in the sap to the outer coat of the stalks, and deposited there to dry and harden in the sun, to give strength, which enables the slender stalk to support the fruitful head.

Let us also remember that every variety of soil grows its own particular variety of plants, and that it is useless to attempt to grow those naturally adapted to one kind of soil upon another. As a swamp is drained and made dry, the vegetation naturally changes. The Ægilops, a wild grass of Italy, cultivated carefully upon rich soils, has become wheat. And if we would produce the finest fruit, we must not only plant the right kind of trees, but we must plant them in the right kind of soil, and give them proper cultivation. Soil that will grow apples may not produce peaches; and careful cultivation may produce almost as great a change in all fruit as growing wheat from Ægilops.

628. **Propagation by Cuttings and Layers.**—Some kinds of fruit are much easier propagated by cuttings than grafts or buds. Cuttings of last year's growth of currants, gooseberries, quince, figs, mulberries, and hardy grapevines, with two buds, one planted below and one above the surface, in good, moist soil, will send out roots and branches, and soon form thrifty plants. The cuttings must be taken off in autumn, and placed in dry soil, about one third out, or in boxes of sand in the cellar, to winter, or else they must be cut very early in the spring, before the buds swell.

Some prefer to have the cuttings a foot long, and plant two thirds of the length below the surface, and that is a safer plan than short cuts, with persons not well skilled in the business. Scientific propagators, with the aid of hothouses, fine soil, and moisture, in pots, will propagate from a single leaf bud.

Propagating by layers is done by cutting a branch half off on the under side, and laying it down under the soil, staked down, with the end turned up, so as to be supported in its growth by the parent stock, while roots start out from the cut, by which a rooted plant is obtained by cutting off the branch beyond the new roots. The limb should be layered in spring, and may be transplanted in autumn, or next spring.

Cherries and some other fruits may be propagated from suckers, where the sort you wish to multiply comes from the root.

As a general rule, suckers of any fruit-tree should not be used for grafting. If other stocks can not be obtained, select your suckers from trees which do not naturally produce them in abundance; because the rule holds good, that like produces like, and if the tree originates from one given to a continual production of suckers, your new tree will be likely to do the same, either from roots, body, or branches. An apple-tree covered with suckers has an unsightly appearance. We have just sent a man through the orchard, in June, to clear it of these useless sprouts, which absorb a great deal of the sustenance of trees, and give nothing in return.

629. **When and How to Plant Fruit-Trees.**—This is still a mooted question, which we can not settle to the satisfaction of any of the advocates who contend, upon one side, that autumn is the very best time; and on the other side, others contend that trees never should be planted at any other time than spring. Is this so? Much the largest portion of the trees planted have been removed from the nursery to the orchard in the spring, often to the inconvenience of the farmer, because he was impressed with the idea that that was the only safe time to dig up, remove, and re-plant them. Yet, in nine cases in ten, where the trees are ordered from a professional nurseryman, he dug them up in the fall, and kept them heeled in, ready for sale in the spring. Now if it is a good practice to dig them up, and bury the roots so as to have them handy to pack up when ordered, why would it not be a better practice to put them at once where they are to grow?

630. **Shall we Plant Trees in Spring or Autumn?**—Andrew S. Fuller, an experienced horticulturist, of Brooklyn, N. Y., says:

"Twenty years ago, the cry was that the country would soon be overstocked with nurseries and nursery trees. But that much-looked-for day has not yet dawned upon a fruit-loving community, and we fear it never will.

"There are at least ten millions of fruit-trees for sale in New York State to-day? Will they all be sold? Most assuredly. Will they all live and bear fruit? No, not one half of them. There are several reasons why they will not, among which we may mention that many are unsuited to the climate; others are grafted or budded upon stocks that have not sufficient affinity for the graft to make a permanent and perfect union; many will die in being transported from the nursery to the place where they are to be planted, owing to improper packing.

"But the great destroyer, and the one who thinks everybody and everything to blame—soil and climate included—is the planter himself; while the nurseryman, as well as others who are careful in such matters, will take trees that have been boxed up on board of a vessel from two to four months, and plant them, and not lose one in a thousand. Another person will take trees fresh from the ground, and plant them again within the hour, and yet he will not make one half grow. Why this wholesale destruction? Simply because the planter is ignorant of the first principles of vegetable physiology, or he is wofully negligent.

"We are obliged to confess that we, as a nation, are very ignorant in regard to many things that pertain to the garden. Most of the European nations are in advance of us in this branch of industry. Besides, we have no patience—when we undertake to plant trees, we hurry through the job. If it is well done, so be it; if poorly done, we blame somebody—generally the nurseryman, but never ourselves.

"Is the fall of the year the best time to plant trees? We answer, Yes, for some kinds, but not for all. We would never plant evergreen trees in the fall, but always late in the spring, just at the time they commence to grow.

"Apples, pears, hardy ornamental trees and shrubs we would plant in the fall, provided our soil was well drained either naturally or artificially.

"If trees are planted in wet, heavy soil in the fall, the roots are very likely to rot or be very much injured before spring.

"When trees are planted in the fall, in suitable soil, the wounds that are made on the roots while being transplanted become healed over; a callosity is formed, from which, or near which, the new roots put forth.

"It is a disputed point among vegetable physiologists whether the callous which is formed on the root is indispensable in the formation of new roots.

"We know it seems natural for plants to form this callous before they emit new roots.

"We make cuttings of hardy trees and shrubs in the fall, for we have found that cuttings made at this time root much more readily than if deferred until spring.

"This is evidently owing to two causes: first, they are not exposed to the cold, by which they lose much of their vitality and power of emitting roots from the alburnum or inner bark, which is always more or less injured by severe cold; second, when cut and put away in a dark place, where the frost does not reach them, they are placed in a position to commence the change from branches to roots, which they must undergo if they live. Now it takes time for a plant to make this change, and it is evident that we had better give plenty of time than too little. Further, roots will form at a much lower temperature than that at which leaves are produced; and, owing to this fact, we can have our plants rooted and ready to furnish nourishment to the leaves as soon as they put forth.

"Trees transplanted in the fall, and the roots properly prepared, cutting off all broken parts, and smoothing the ends with a sharp knife, will commence the formation of roots in the spring, long before the leaves are produced. Yet most persons will succeed better with spring planting than with fall planting, because trees require much care to keep them in a proper position through the winter, when they have lost a portion of their roots.

"In transplanting trees either in the fall or spring, they should always have a portion of their branches pruned; no matter how carefully the operation may be performed, the roots will surely receive a check, and some of them may be lost; therefore, to establish an equilibrium between root and top, a portion of the latter should be cut away. We always shorten the branches at least one third when we transplant any deciduous tree.

"If we receive trees that have become dry and shriveled by long exposure, we bury them, root and branch, in the ground, and let them remain there until they have swelled out to their original condition; then lift the top branches first; then, in a few days, lift a portion more, and so on, until the whole stem is exposed. Then take it out and prune it severely and plant it. A tree that has become so dry that it would never show a sign of life if planted immediately, will often make a vigorous growth the first season if treated as we have described.

"One fatal error into which many fall is in buying large old trees instead of small, young, and thrifty ones. The old adage, 'Haste is not always speed,' is wonderfully true in this case.

"What we strive to get by fall-planting is to get the trees in a condition to grow at the earliest possible day in the spring. The roots of a fall-planted tree will heal and begin to grow in the fall, if properly planted, and not too late. That is why I advocate fall-planting. I transplanted some peach-trees in the middle of summer by cutting off all the limbs, and the trees lived, and are now growing finely.

"Pear-trees may be transplanted at almost any age or size, but as a general thing two or three years' old are the most convenient size. In planting dwarf pears, we want all the quince stock to be covered; the junction to be one or two inches below the surface. If the root is too long, and there is danger of the lower roots becoming injured by being buried too deeply, cut off a portion of the lower end. If your soil is as deep as it should be, and well drained, then the quince root will remain perfectly healthy one foot below the surface; if it is not, then you had better defer planting dwarf pears until you can properly prepare the ground for their reception.

"There is no danger of planting dwarf-trees upon land that is dug two feet deep. The quince stock should always be buried so as to throw out roots, but if the root is too long, be sure to cut it off. Trees should never be grown in the nursery with deep roots. Care should be had in cutting back the first year's growth of a tree, to cut it at a bud opposite the side budded, so that the main limb will balance the tree. Cut off all the ends of long roots and most of the fibrous roots, and all that are broken or bruised, when you transplant a tree."

"In Great Britain," says *Hovey's Magazine*, "planting is continued from autumn until spring, the weather usually being sufficiently mild to permit of this; besides this, the latter season is dull and moist compared with our own, and there is no heat of summer to disorganize and set at naught all that has been accomplished. No cloudless skies and torrid blasts of weeks' duration disturb the fears of the planter or blight his hopes. Whether done at one season or the other, though there may be some preference even in that climate, there is little or no danger that any fatality worthy of consideration will attend the labors of the cultivator, and he may await contentedly the result.

"But all is changed here. Spring arrives with its cold storms, making the ground as the frost leaves it, a cold, clammy, sodden earth, too wet to dig or plant, until so late in the season that the trees have already begun to swell their buds and put forth their blossoms. Yet, so rapid is vegetation, that the work must proceed with haste, or the opportunity be lost till another year. Even under these disadvantages, all would be well enough but for the summer heat and drouth. These set in at once, before the tree has had time to recover, and following so close, exhaust the sap, shrivel the wood, and if they do not kill the tree, enfeeble it more or less, so that at least one year is lost in the work of recovery. If these are the effects that follow in our climate, which we think will not be denied, then, at least, it must be acknowledged that climate must be taken into consideration in transplanting; for however advantageously the operation may be performed in a cool, damp climate, like that of Great Britain, it will not do here.

"There are few springs, unless late in May, when the soil is in such a loose, dry, and friable condition as it is in the latter part of October and November. Besides, it has not yet parted with its warmth, which is of more importance than is generally supposed; for the roots, yet active, continue their growth when not checked by cold and wet. Experiments have been accurately made by careful planters, who have found fresh roots from trees, transplanted in October, in a growing condition during the winter. The opportunity to prepare the soil, its better condition at the time of removal, and its greater warmth, are all in favor of autumn planting.

"As a general rule, do not have manure, unless perfectly decayed, applied in immediate connection with the roots, particularly in spring planting, for it acts as a stimulus when the delicate fibers are not in any condition to absorb it, and the effect is to cause their decay rather than their growth and extension. Especially is this the case when the summer is dry and hot. But in autumn planting there is not so much danger of injury, even with fresh manure. The soil, cooling down as winter approaches, prevents any heating effects from the manure, while its mechanical operation is to lighten the earth when it would too rapidly become compact by winter rains. In autumn planting, manure is best applied upon the surface of the soil, by the application of a bushel or two immediately around the tree. This not only protects the earth from deep and penetrating frosts, but all the entire strength and virtue of the manure is carried into the soil."

631. **Simple Rules about Tree-Planting.**—A great many other experienced persons just as earnestly advocate spring planting. Our opinion is, that both are right, under certain circumstances. Upon a well-drained or naturally dry soil we should prefer to plant in the spring, if it could be done early. If farmers will prepare the orchard ground by deep plowing and subsoiling in the fall, and by digging large holes, leaving them open, and the dirt thrown out in a pile, to be pulverized by the action of freezing

and thawing, and then set their trees early in the spring, there will be no doubt about their growing. As tree-planting is generally done in the hurry of spring work, we are sure it is not as likely to produce good results as autumn planting. But whether planted in spring or autumn, it is of the utmost importance that the tree has not been spoiled in taking it up. There is where most trees get their death-blow. Adopt these few simple rules, whether you plant in spring or autumn.

First, have plenty of roots to your trees. Second, dig large holes and make the ground mellow at the bottom. Third, do not set your stocks too deep. Fourth, fill the earth carefully around them, and trample it solid. Fifth, raise the earth slightly, so the water can not stand in a puddle around the tree. Then cover the ground, four or five feet each way from the tree, with some kind of mulching, and depend upon it you will not complain of trees dying. There is one thing more for you to do. Keep your horses, cattle, sheep, and goats out of your orchard.

The best form of setting apple-trees is that called *quincunx*. Set four trees two rods apart in a square, and a fifth one exactly in the center.

"No tree should be planted in a hole less than four feet square and two feet deep. The bottom of the hole should be well loosened, and a compost of leaf-mold and manure mixed with it. In planting, care should be taken to cut off all bruised or broken roots. In filling, the soil should be finely pulverized and worked in among the roots, and the tree gently shaken up, so that the soil may reach every root.

"A tree should never be moved backward and forward, as every pull you give it draws the roots out of their places, and causes them to become doubled up, thus defeating the very object you had in view when you spread the roots. Great care should be taken in treading in the soil, for if not properly filled in, the roots are very apt to be broken off.

"Avoid deep planting; more trees are lost every year from this cause than any other. No tree should be planted more than a couple of inches deeper than it was before.

"Mulching trees after transplanting is a very useful practice; in winter it helps to exclude frost, and in summer prevents evaporation of moisture, and prevents the roots from suffering from drouth.

"In pruning the heads of trees before transplanting, much will depend upon the size of the tree; large trees require more pruning than small ones. It needs but little judgment to enable the planter to ascertain how much of the top it is necessary to prune, in order that the loss may be equalized between the branches and the roots. The poor success attending the transplanting of the large trees in the Central Park of this city may be attributed to the fact of their not having been pruned; if one third of their tops had been taken off, the result would have been different.

"In transplanting, two very important things are to be considered: first, preservation of the spongioles of the roots; second, the prevention of evaporation. The next important part is to choose that season when the tree or plant, according to its kind, is either losing its sap in a state of repose, or just before sap commences to start for another season; each has its advocates; every tree, even of the same species, will not admit of transplanting at the same time, and it will therefore depend much upon the judgment of the planter. The majority are in favor of early autumn planting, but this has reference to the state of the plant as well as the state of the season."

Although large trees may be transplanted by following the advice given, it by no means follows that it is advisable to buy large nursery trees, because both theory and practice indicate that it is more economical to transplant small trees, that is, from three to seven feet high. The impatience of those who are about to establish new orchards is very apt to prompt them, whether buying trees, or moving them from their own nursery, to select trees too large for successful transplanting. Young, vigorous trees, of the size of a man's thumb, three feet high, will generally produce a bearing orchard sooner than trees four times that size, and not one tenth as likely to die at first as the large ones are, and the mature trees will last much longer, because they need not lose much top or roots in transplanting, and the vigor of growth will scarcely be checked.

Whenever it is possible, go yourself to the nursery and select your trees and see them dug, choosing always good stocky plants, rather than large sizes. The sooner you get them home and in their places the better; but if you can not move them home at once, see that they are carefully heeled in to await your order; and when they arrive at your place, if you are not ready to plant them, have them heeled in where water will not stand about the roots; and in so doing, let the trees rest easy at an angle of about forty-five degrees, with dirt well sifted among the roots, and if to remain over winter, you may cover the ground over the roots with mulching, but do not cover the bodies of hardy trees, lest you make a harbor for mice. If possible, have your orchard ground, and the holes for trees, all ready before you go to the nursery.

632. **How to Move Large Trees.**—If you desire to move a large tree, whether an apple or any other kind of fruit, or a forest-tree, you must commence the year before, or at least the autumn previous, by digging a trench around and cutting off the roots, leaving a ball of earth with the tree in the earth. If the tree is very large, it is best to remove it while the ball is frozen, and this can be done with a pair of timber-wheels, lifting and keeping the tree upright. It can also be done with an ox-cart, by tipping it up and fastening the tree to it, and then tipping it down, with the root hanging off behind. It will generally be necessary to load stone on the forward end of the cart, or else have three or four men jump on to make it balance. The tree may be loaded on a wagon, without any box, by backing up to it and pulling the top down, so as to have the roots hang behind the hind axle. The tree may also be pulled over and rolled upon a sled, or set upright on a stone boat. If you move any tree with a large top, you must also move a

large root. The trimming of the tops and roots should correspond. It is a good practice to prepare trees of large size for moving two years in advance, by digging and cutting all the roots around the center ball of earth, and then filling the trench and leaving the tree over one summer to throw out new roots, and heal the wounds of the ones cut off, and also the wounds of the limbs. By this process a very large apple, pear, cherry, or other tree can be safely moved.

We have known a farmer to defer building a new house, year after year, because he could not build without destroying some favorite tree, and did not know how to move it. We have often known a new road fought against for years because it would cut through some man's orchard, the owner of which finally had to yield to the necessity of the case, and see his valuable trees sacrificed, perhaps just as they were large enough to commence bearing, because he did not know how easily he could move them. It is our opinion that, as a general rule, trees from four to ten inches diameter can be moved at an expense not larger, per tree, than a dollar for each inch the tree is in diameter.

An orchard, with half the trees prostrated by a gale, the trees of which would average eight inches in diameter, we have seen righted at an expense of not over a dollar a tree. The broken roots were carefully cut away, and the earth behind properly excavated, and about half of the top cut away, and a tackle attached from a standing tree to the fallen one, when two men would set it up in five minutes and brace it fast with two poles. The second year after, these trees bore as good a crop as they ever did before.

Thomas Cavenach, an experienced and observing gardener of Brooklyn, furnishes us some good rules about moving trees. He says:

"Large trees and shrubs can not be removed without injury to their roots and at their ends, the very parts of most importance to them, because there the spongioles are situated, and these, if once destroyed, must be reproduced before the plant can derive any nourishment for its future support. Trees removed in the fall will have these organs the soonest produced, and in the spring the latest, if at all in the later case; the trees are left without support at the very time they most need it, and in consequence the leaves wither, the tree dies, or becomes greatly injured. The state of the weather has much to do with the successful removal of all trees. Dry, windy, and frosty weather, as well as very warm sunshine, is the most unfavorable of all; evaporation goes on more rapidly in such states of the weather than at any other time. A mild, damp day is the most fitting for the operation of transplanting, and this will be greatly enhanced if mild showers fall during the night.

"Small trees and plants may be moved with less chance of failure than large ones, because their fibers are less liable to injury than others. Evergreens should always be removed when in a growing state, because the moisture surrounding the roots is absorbed, and at once assimilated as food for the plants. The wounds where the roots have been injured quickly heal over, and new roots are formed; but if removed in winter, when the ground is frozen and the tree in a dormant state, the moisture which surrounds the roots has a tendency to rot the portion of the roots where they have been severed.

"Forest and fruit trees may generally be most advantageously moved in autumn, because the wounds made in their roots will commence to cicatrize and throw out granulous matter, and sometimes even spongioles immediately, so that by the time spring arrives the tree will grow with almost as much vigor as if it had not been transplanted.

"Preparation of the ground is the most important matter connected with moving trees. I have known many who could not in other matters be called ignorant persons, plant trees much in the same way as we would set up a post in the ground, under the mistaken idea that a tree, when it is placed in the soil, will grow under any circumstances.

633. **Preparation Necessary for Tree-Planting.**—The greatest cause of failure of success in growing trees is in the preparation of the soil. Let it be remembered that the soil for a tree nursery should be as good and well worked as a well-cultivated kitchen garden. Manure, and particularly that made of leaves or ashes, is valuable for tree nurseries, whether fruit or forest trees. Weeds must be exterminated, or they will destroy the nursery. Care must be taken in selecting soils. No wet soil, nor a ferruginous one, should be chosen. The young trees, too, must be carefully guarded against the depredations of cattle, as all farm-stock are fond of young shoots of most fruit or forest trees.

Do not plant trees on a retentive soil in wet weather. It is almost as necessary to keep a new plantation of forest-trees or an orchard clear of weeds for two or three years, as it is to keep the nursery clean.

In all cases farmers should be much more careful in preparing the soil and planting trees. The want of success in growing fruits is to be traced to negligence in this department, because a tree is a vitalized body, possessed of delicate organs, by means of which the tree is enabled to build itself up from the food to be found in the soil and the air—also to perfect its fruit. Study the habits of your trees, and give them all they require. But of one thing do not lose sight: all fruit-trees of value require a loose, deep soil, free from excessive quantities of water, and well supplied with mineral food. If your soil is wet, drain it deeply; if compact, loosen it with a plow as deeply as possible, and follow in the bottom of the furrow with the lifting subsoil plow, if in a field; and if in a garden, trench the soil deeply throughout the whole plat. Supply no manures but those well decomposed, such as woods-mold, muck, chip dirt, rich road scrapings, composted with ashes, or salt and lime, or both, some weeks before applying them to the soil, mixing in the compost a small quantity of fine barn-yard manure.

When the soil has been thus prepared, place the tree no deeper than it grew in the nursery, unless it be a pear on a quince stock, when it should be left so as to entirely cover the quince with soil. None but the best soil should be put under or about the roots. No plaster, ashes, phosphates, or guano should touch them. No fomenting manures of any kind should be allowed under the tree to injure its roots by the escape of gases. Sprinkle fine soil on the roots while the tree is held still, regulating it as necessary to secure the natural position. In all but heavy clay soils pour a pail of water over the loose earth and allow it to settle away before setting the tree. Do not churn the tree up and down in the hole. Do not trample on the earth with your feet, leaving great spaces in which no soil finds its way. Do not throw in clumps of earth or stones. Fill up the hole carefully, keeping away grass and sods. Cover a wide space around the tree with coarse litter, leaves, salt-hay, sawdust, tan bark, or stones loosely piled around. These will shade the soil, keep in moisture, and enable you to water the tree without forming a thick crust on the top of the soil, or packing it down too closely.

Should you be unable to subsoil or trench all your land, dig wide and deep holes, leaving out all the subsoil, returning nothing but surface soil, and proceeding as before. For large trees, use strong, limber stakes, to which they should be attached by soft ties of willow or straw. Trees thus carefully set will grow and reward the planter.

634. **How to Winter Young Apple-Trees.**—A new beginner in the nursery business, in Wisconsin, wants information. He says: "I planted, last fall, about three acres of ground to apple-seeds, and have now some fifty thousand fine-looking plants. Now will it be the best way to take them up and house them in a cellar the first winter, or leave them standing, and shall I cover them or not? If taken up, could I graft them successfully during the winter? Which is best—to graft them in the root or stock?"

It is the safest plan to take them up and store them in a dry cellar, or else heel them down in furrows in the nursery grounds where they grew. They may be grafted, when of the size of one fourth to one half inch in diameter, inserting the graft in the stalk close down to the crown of the root. On account of grafting, it is better to put all that are large enough in the cellar, where they can be got at to work upon in winter. If left standing and covered, the trees are sometimes half cut off by mice.

L. M. Parsons, of Waukau, Wis., speaking of the benefits of snow, says:

"The virtue of perennial life is due to processes which can only be carried on in conditions which exclude the light, like that of snow, rubbish, or shade. Indeed, the tannin increment is almost limited to snow-clad districts; and perennials are the most abundantly supplied with it where the concealment of snow in winter is continued through the summer by the agency of moss, leaves, and shade. Hence it would seem, that to perpetuate an old orchard, it should either be supplied with the perennial increment in solution, or that the ground should be so concealed from light as to secure a perpetual elaboration of that element.

"This view is supported by the dwarfed appearance of perennial plants throughout the prairie region of the West, where autumnal fires, from time unmeasured, have robbed the soil of every concealing object, thereby limiting the time of perennial gestation to the short period of shade afforded by cereal plants, and the quantity of perennial food to the simple want of such plants, wherewith to embalm their seeds. Hence young orchards, on our richest cereal soils, like our scattered forest trees, are weak in fiber, false in heart, and early show the marks of dotage, and on them the undying parasite makes his pre-emption before his time. Nothing is more fatal to prairie orchards than open culture, or blighting than the plow, and nothing more beneficial than straw, boards, or anything to make concealment. The soil of old orchards, however well supplied with the embalming element, in its virgin state, becomes exhausted by open culture, naked grazing, and usually deprived of shade by the unsocial distance of the trees, so that in the run of time the soil of Eastern orchards, like Western prairies, fails to do perennial service.

"Six years ago I put out some nursery trees of three years' growth, on prairie sod, digging the pits only three inches deep, with a drain, and covered the roots with soil from an old cultivated field, and having scattered potatoes over the ground, covered them with straw fifteen inches deep, putting a little dirt on the top to pack the straw, and some sawdust around each tree to protect it against mice. I had a good yield of potatoes, all the trees lived, and now have the spread of an old orchard, and give a good yield of fruit. One tree was set where there had been a hog-pen; that tree has borne, for five years, the finest of fruit (though a seedling) to such extent that it has been necessary to support every limb, and it now measures fifteen inches around its body a foot above the ground. None of these trees have a blight upon them, while trees near by, treated in the usual way of open culture, have not over one third the growth, and already show the mark of dotage, the yellow leaf, and the worm of time."

Snow sometimes proves detrimental to trees, by affording the mice an opportunity to gnaw them. The following is given as a remedy by Andrew Kerns, of Grundy County, Ill. He says:

"Last winter, the first we knew, ten or fifteen young apple-trees were completely stripped of their bark—some of them from the ground eight or nine inches upward. Upon examination, we found a number of mice-roads through the frozen ground and grass. We mixed two ounces cayenne pepper in a pan of soft-soap, and gave all the trees—about one hundred—a good coat of this wash with a brush, and not a mouse has touched them since. We shall repeat the dose next winter."

635. **Winter Protection—Fruit-Trees on the Prairies.**—We advocated the plan, twenty-five years ago, of planting orchard trees on the surface, hauling up a sufficient quantity of earth to cover and support the roots, instead of putting them below the natural level of the earth, where, in many sites that we have seen orchards planted upon, the water would stand for weeks, so as to completely cover every fiber of roots. This is not alone the case upon flat

prairies, but frequently where it is quite rolling, the soil being of such a nature that it retained water almost as well as a sponge.

Had the plan been generally followed by those who have planted orchards upon rich, loamy, prairie soil, there would have been now many more thousands of apple-trees alive in Michigan, Indiana, Wisconsin, Iowa, and Missouri, in all of which States we have annual moanings over winter-killed fruit-trees. If all orchards were planted and tended like the one mentioned in the following extract from a letter in the *Prairie Farmer*, we should cease to hear anything about winter killing. We advise all prairie orchard owners to put the plow at work. The letter alluded to says:

"I visited, not long since, the successful orchard of 75 acres owned by Mr. James Wakeman, of Cottage Hill, Du Page County. One of the leading features of this orchard is, that the trees have the appearance of being planted on ridges, which has been caused by annually plowing toward the trees. He commences plowing next to the rows of trees, and this leaves a deep furrow in the center between the rows, which acts as a partial drain—a very efficient surface drain in winter. For when the snow is thawed by the influence of the sun, the ground being frozen, it runs into the hollows, as it can not penetrate the soil, and if the slope is completed to the dead furrow, it flows there. But if there is a hollow immediately about the body of the tree, water settles in it. I have seen it stated recently that the expansion or lifting power of ice is nearly equal to twice the lifting power of gunpowder. Hence the effect of a body of ice immediately about the bole of a tree—hence, too, the importance and benefits of banking up with earth, in the fall, so as to shed off water. I have had trees destroyed in winter by ice forming about the collar, and I have seen hardy grapes ruined in the same way. Scores of trees, whose bodies are otherwise protected from freezing, are killed at the collar by this lifting ice. It is a good plan, I think, to bank up about trees in the fall, and especially to plow orchards as above described."

It is a good plan—there is no doubt of it—to plow every orchard upon retentive soil, in the manner indicated; and the advice, like the almanac, is suited to all places in this latitude.

It is true the best plan is under-draining; for there is not one acre in ten in all the West that will grow an orchard successfully until it has been thoroughly drained; and even then, we believe ridging the ground before planting the trees would be advantageous. Some kind of winter protection is also much needed, particularly for nurseries.

When an exposed situation is unavoidable, then the very first step should be to provide shelter in the speediest possible manner. For this purpose, belts of rapid-growing trees—say double rows—should be planted so as to intersect the ground at intervals, and ward off the prevailing and most injurious winds of the particular locality. In the culture of dwarf trees, flowers, vegetables, and all crops of low growth, common hedge-rows of buckthorn, privet, Osage orange, or any rapid-growing shrub, will be of great service as a protection from cold winds, though some of them exhaust the soil.

The value of woodland for a winter protection of orchards is not sufficiently appreciated. The prairies have never been wooded. The land is now just in the natural condition of the bottom of a lake, from which the water has receded and the land dried up, and which first produces weeds, then grass, and afterward trees, as the prairie land now readily produces them where fires are kept out; and one of the wisest things for any one who would grow an orchard or nursery of choice fruit upon such open grounds, is to begin with a belt of forest trees. The locust, *Robinia pseudacacia*, will grow in five years so as to form quite a shelter.

A correspondent gives us a detailed account of his observations upon a piece of wheat in Delaware, about five acres of which, alongside a grove, made a good crop, and seventy acres exposed to the full blast of an almost Siberian winter was not worth cutting. He says also of the effect of woodland in Michigan upon fruit-trees:

"Our orchards here did very well when the country was new and the clearings were small. But as our forests recede from the orchard, the bark on the west side of many a fine fruit-tree is killed by the piercing west wind. Some of our neighbors have very considerately preserved belts of timber and clusters of shell-bark, black walnut, and butternut; while others, like time, have cut down all, and are now gathering the fruits of their folly instead of their orchards."

The winter protection of snow is one of the causes of health in many trees. Without it they would perish.

636. **Cheap Labels for Fruit-Trees.**—Take two pieces of wood, and hinge them together with a leaden wire, and write the name between the two. The lead wire is preferable to all other metals, because it is always flexible and readily adjusted. The name being written on the inner side, is shielded from the action of the weather, which soon effaces the name when exposed. The cost is not over fifty cents a hundred. Zinc labels, written over with a lead pencil, are also durable. If written upon with any acid ink, it will eat the name into the zinc.

The following recipe for making ink that is indelible, used on zinc labels, is recommended: Take one drachm of powdered verdigris (acetate of copper), one drachm of powdered sal ammoniac (muriate of ammonia), half a drachm of lampblack, and ten drachms of water. Mix the ingredients together in a two-ounce vial, and shake it every time before using it afresh, and from time to time while using it. It is ready for use as soon as the verdigris and sal ammoniac are dissolved. In using the indelible ink there is one secret to be attended to, it is this—that the zinc label should, just previously to being written upon, have been rubbed bright with some fine glass-paper. A steel pen is far better than a quill for writing on zinc.

The best form of tree-labels we ever saw or used is made of a slip of zinc, seven or eight inches long, three quarters of an inch broad at one end, tapering regularly to a point at the other, with a quarter-inch hole in the big end. On these labels a number or name may be stamped, or the name of the fruit written with ink prepared as above, or with a soft lead pencil, which latter is remarkably permanent, though not very conspicuous. The danger of cutting trees by attaching labels by wires is so great that it should be guarded against; the label is broken off, or forgotten, or unnoticed, and by the growth of the stem or limb it is nearly cut off by the wire. With these labels that difficulty is obviated. The zinc strip is bent around a limb, loosely, and the pointed end tucked through the hole and clinched.

SECTION XXXVI.—THE ART OF PRUNING, GRAFTING, AND BUDDING.

GRAFTING, budding, pruning, are all arts that must be acquired, like any other art or work of skill. A pruner must understand why he prunes, and never cut a limb without first being fully aware of the effect. Yet pruning is mostly done at random—a limb here and a limb there is cut away, the top lessened, and that is all. The fruitfulness of the tree is not improved, and its looks as a systematic work, such as nature builds, most decidedly injured. It is idle for any man of common sense to employ an itinerant pruner. They are often ignorant of the first principles of the art, and generally do more harm than good. If you doubt it, ask this question of one when he is about to cut off a limb: "What for?" If he can answer that to your satisfaction, he possibly understands his business, provided you can answer the question yourself. This is the true law of pruning. Never suffer a tree to go unpruned that needs it, and never cut away a limb without first asking and answering that question—what for?

If you understand the art, you may have a tree of any desired form, and always of handsome shape. The great feature of this was cutting back very short the first year's growth. Never plant a tree with a full top. Pruning in autumn makes the strongest trees or vines. Spring pruning produces the most fruit. A weak-growing tree should always be trimmed in autumn.

637. **The Right Time for Pruning.**—The right time is in the growing season—the time when wounds heal the most readily. The time to begin is the first year of growth in the nursery; not to trim up sprouts to grow whip-stalks, but to shape the trees just as nature intended the particular species to grow. If an apple-tree, a short bole with a round, symmetrical head; if a pear-tree, a somewhat longer bole, with a top shaped like a well-formed, slim haystack. A peach-tree may be grown with a single short bole and a very open-branching top, or it may be branched from the ground by cut-

ting away the top of the young shoot the first year—a plan that we prefer. A quince-bush should always be grown in that way, branching from the root; and it always looks to us like forcing nature to prune a currant-bush into the form of a tree. A dwarf pear-tree should be pruned from the start to form a pyramid or sharp cone. Look at the extinguisher of your candle for a pattern. Cherry-trees do not need nor bear much pruning, except to cut away the winter-killed ends of limbs, and that should be done to all trees. As a general rule in pruning, study symmetry; it is the first law of beauty; if you can not see it otherwise, try it upon yourself. Lop off a right ear, a left eye, a right hand, and so on, just as some pruners do the symmetrical beauties of a tree. In pruning all sorts of fruit-trees, keep "What for?" constantly before your eyes. The answer is, to increase their productiveness. This can not be done by cutting away many healthy limbs, but by disentangling them, so as to let in the light and air to the center of the branches.

638. **Over-Pruning.**—There is a tendency to over-prune among all amateur fruit-growers, and more particularly among all who are just beginning to grow ornamental shrubs and trees. There is no practice that needs reform more than this one. There is no quicker way of spoiling such trees than this injudicious over-pruning. There is not one forest-tree in ten that will bear the eternal clipping to which some are subjected. Autumn appears to be the most favorite time for this sort of vandalism. There is nothing like the let-alone system, and above all for all sorts of evergreen-trees. With very little assistance, nature will do all the pruning that is required. Use the knife and shears only to assist nature, when trees are brought into unnatural situations. Of evergreens, do not cut away the lower limbs till you make your tree look like a big broom with the handle stuck in the ground. In all pruning of fruit or ornamental trees, or shrub or vines, do not make a cut till you think what for, with what object, and what will be the effect. This is always necessary to prevent over-pruning.

639. **Objections to Spring Pruning.**—There never was a more certain truth uttered than the following words of the editor of the *New England Farmer*, who is not only a practical farmer, but one who never does a thing without first answering the question, "What for?" to the satisfaction of his own reason, and therefore is more entitled to attention than a mere utterer of dogmatisms. He says:

"Never prune an apple-tree in the months of March, April, or May. All the borers in the world do not commit half the havoc in our orchards that the pruning-knife and saw do, applied at the wrong season of the year. In the spring the sap is abundant, thin, and active, and where limbs are taken off, it passes through the pores of the wood to the surface, and coming in contact with the atmosphere, becomes bitter and acrid, runs down the bark and poisons it, so that it is often killed quite into the wood. This is what causes most of the black lines so often seen upon apple-trees, which frequently causes their death."

640. **Objections to late Autumn Pruning.**—William S. Carpenter, of Westchester County, N. Y., has devoted much attention to the cultivation of fruit, and he says: "There is no time so good as midsummer to prune all sorts of fruit-trees, and no worse time than late in autumn. That is rather worse than early spring. I am an advocate for pruning young trees in summer with the thumb and finger, or a pocket-knife, so constantly and regularly that they will never require the saw. If that must be used, let it be applied in midsummer. With me that course is the most successful. In planting trees, apple or pear, I dig two feet deep and six feet wide, and fill the hole with good soil, and set the tree nearly level with the surface, and never use manure. I make the earth very fine, and am careful in setting them. In budding pears upon quince, set them on very short stalks. A dwarf pear set upon a quince stalk a foot high is almost worthless. It will be quite so if not carefully pruned."

Another practical fruit-culturist gives the following:

641. **Practical Directions about Pruning.**—"Trimming is now reduced to a system. By dwarfing various kinds of trees, such as the pear on the quince stock, we are enabled to train it and keep it within our reach, and make it both ornamental and useful. The most approved form is the pyramidal. In order to form a perfect pyramid, we should encourage the tree to branch near the ground, and train the side branches so that they will be regularly distributed along the body. To effect this, summer pruning or pinching must be resorted to. Having as many side branches as we desire, we may continue its shape by pinching off the laterals from the side branches when they have grown to about three inches in length, taking care to leave these laterals about one inch long after you have pinched them; these will again push and grow, and must be treated as before. This method of summer pruning will check its woody growth and force it to expend its energies in fruit-bearing, and at the same time increase the size and quality of the fruit. For standard or orchard trees, a different treatment must be practiced. For these, but little pruning is necessary, beginning when the trees are young, and annually going over the orchard. Cutting out all suckers and crowded branches, you avoid the necessity of cutting off large limbs in after years—a practice that should always be avoided. I have seen whole orchards nearly destroyed by this injudicious pruning. A limb should never be cut from a tree when more than two inches in diameter. Pruning should never be done except late in the spring or in midsummer. I would never prune a tree in winter. A limb cut off when full of frost will cause the wound to crack and split, thereby admitting the air into its wound, which will soon cause it to decay. It is to be regretted that so little attention is paid to the orchard. It is quite common to see suckers growing around the bodies of trees until they are nearly hid from view, their branches covered with moss, and putting on altogether a stunted and neglected appearance. You come to the conclusion that the owner of such an orchard does not think that fruit-growing is profitable. The wonder is

that such trees bear at all. But they will make an effort, as it is natural for all fruit-trees to reproduce, but the specimens will be miserably small and deficient in flavor. If we desire good fruit, an orchard that will pay, trees that will delight us and our friends, we must do something for them. We must clear away all suckers, scrape off all the old rough bark and moss that have been the safe abiding-places for the destructive insect, and then with a solution of potash and water wash the trunks and limbs of the trees. If the orchard is yet young, plow it and put on a good top dressing of manure, and then cultivate a crop of potatoes, or corn, or any other crop that will require thorough tillage; follow this practice for a few years, and you will find it will most effectually renovate your orchard, and you will be made to acknowledge that fruit-growing is profitable, and that your orchard is your dependence and delight, and you will be found encouraging your neighbors to plant, and thus extend this delightful branch of industry."

642. **Root-Pruning.**—Root-pruning is apt to induce fruitfulness where the tree is making a too rapid growth, and pruning during the growing season in June will accomplish a similar result. Putting a wire around a branch of the grapevine so as to obstruct the flow of sap, will improve the quality. Root-pruning is to check the too rapid growth of wood. The result of ringing the vine is the same, and that enlarges the fruit.

Various methods have been proposed for making fruit-trees bear early. As a general thing, it is not best to force trees into early fruitfulness, as it is necessary that they should have time to make a good and substantial growth, and obtain a proper form to bear, in after years, the strong demand made upon the vitality of the tree by successive crops. Root-pruning tends to induce a slower growth and more solid ripe wood, and checks the tendency to over-bearing, which always injures the young tree.

643. **Grafting and Budding.**—It is easy for any one to learn to graft, but to be a skillful grafter or budder requires a steady hand and a good deal of practice. No farmer—indeed, no person having an interest in a garden spot—should neglect to learn how to perform both operations skillfully, because it is the true way of propagating almost all choice fruits. It is an art which women can practice as well as men. It has been practiced from a very remote time, as we have accounts of it in the earliest printed books.

The proper time of grafting fruit-trees is in the spring, as soon as the season is warm enough to put the sap in motion. This period comes earlier with the cherry and plum than it does with the apple and pear. In this vicinity apple-grafting often continues till the last of May in backward seasons. The best time is when April showers are prevalent, but the scions must have been previously cut. They may be cut and buried in autumn, or stored in a dry, cool cellar, with the lower ends in sand or dry soil. For scions, cut the thrifty wood of the last season's growth from bearing limbs—not water sprouts. Those shoots found near the top or center of the head of an old tree are preferred by grafters. Never cut scions from sickly trees or branches. Scions from young trees are apt to grow most vigorously, and we prefer them from the upright branches.

Stocks for grafting, if not grown on the spot, should be transplanted to the nursery at least a year previous to being used, as there is not usually vigor enough in a tree to recuperate its own powers and grow a graft the same season it is transplanted.

644. **Grafting an Old Orchard,** with the design of giving trees entire new heads, is practiced as follows: Commence the summer previous to cut away the old tops freely. Next spring set the grafts, cutting away all that is necessary to give them room, and free sunlight and air. Next spring, go over the trees about the first of June, and pull off all the suckers, particularly around the grafts, and cut off any limbs that interfere with their growth. We advise a side branch left upon each limb that has a graft in its end, to aid in keeping up a healthy circulation. Indeed, branching limbs should always be selected in grafting an old tree. Watch the growth of the grafts during the second summer, which is sometimes very rapid, and may reach overhanging limbs; in which case, cut them away. In June or July, after the grafts are two years old, nearly or quite all the old top may be removed, and, if necessary, the grafts trimmed slightly, to put the top into the right course of forming a new, handsomely shaped top.

645. **Cleft Grafting** is the mode practiced in putting a new top to an old tree. That is, a large limb, or one perhaps two or three inches diameter, is split by driving a strong knife or chisel in the end just sawed off, and the cleft held open by a wooden wedge, driven in the center, while the scions are sharpened and inserted in the edges of the cleft, so that the bark of graft and stock exactly fit, and then the wedge is withdrawn, and the end of the limb covered with grafting-wax.

646. **Splice Grafting** is practiced when the stock and graft are of equal size, by cutting the stock with a sharp knife scarfing upward, and the scion downward, so that the two will fit an inch or two together, the edges of the bark exactly corresponding, and then the two are tied together with bass matting, or woolen yarn, if the former can not be had, and covered over with grafting-wax, or grafting clay, which by some is preferred. Some grafters spread their wax on strips of cotton cloth, and wind that around, and stick fast the end or tie it. Watch must be kept after the graft is growing vigorously, that whatever is tied around does not get too tight before it is cut off.

647. **Tongue Grafting** is much like splice grafting, except that a shoulder or sort of cleft is cut at the bottom of the scarf on the stock, and the point of the scion cut to fit in it, or else the notch is cut in the upper end of the scarf, and the scion shaped to fit. By this mode small grafts can be set upon large stocks, or four can be set upon a stock so as to form a four-branched head, if all grow. All that is necessary is to see that there is some point of contact of scion and stock, and that the inner bark of one exactly fits the other; the more the better, but the graft may live with a very

small point in connection, if carefully fastened and covered. The covering should be removed about the middle of July. If clay is used, remove the ball after a rainy day.

Care should be used, in cutting a scion, to have a bud come close down to the top of the stock.

648. **Root Grafting** is much practiced by nurserymen, the scions and roots both being stored in autumn, and the work done in winter, by splitting the end of a root and inserting the scion, and laying these away in a cellar till spring, when they are planted out; the joint being entirely covered, no wax is used. Farmers may do the same. Sometimes roots are grafted while attached to the tree, by digging them up and cutting off an end and inserting the graft, and then putting the root back, with the end of the graft out of the ground. When it is a year old, a section of the root is dug up and transplanted.

649. **Saddle Grafting,** which is done by cutting the stock to a wedge, and splitting the scion, is particularly recommended for cherry-trees, because it gives a larger surface of union. Sometimes one leg of the scion is fitted so as to insert between the bark and wood of the stock, while the other leg is brought down and fitted upon a scarf on that side of the stock.

650. **New Method of Grafting.**—Horace Everett, of Council Bluffs, Iowa, writes us about a method of grafting common in Tennessee, that may be worth knowing in other localities, and which he says is not described in any fruit-book that he has read. The following are the directions:

"A long, smooth shoot or limb is selected, cut from the tree, and a sharp iron wedge driven through the limb, every four or five inches. Upon withdrawing the wedge, the graft is inserted, allowing the shaved end to extend an inch or so through, so that when a graft had been inserted in every split, the limb looked like a long stick, with the grafts extending from it at right angles, a shoot of four feet having about twelve grafts. This stick or limb was then buried in the ground, the top of the grafts only being allowed to come above the surface. During the year the grafts took root, and grew from twelve to thirty-six inches. The next fall the limb was taken up and sawed apart between the grafts, thus leaving every graft with a portion of the limb adhering to it in the shape of a cross. I planted these grafts, and the trees grew and throve well. It is certainly a very cheap and economical stock for grafting."

651. **Natural Grafting.**—We give the following reported fact for the encouragement of farmers who may happen to entertain any doubts upon the practicability of grafting:

"There is a white oak tree, of fine healthy growth, standing near Robinson's Coal-Oil Works, in Perry County, Ohio, on which, at fifty-five feet from the ground, is engrafted a black oak top of lofty and vigorous growth. It is about two feet in diameter at the usual hight of cutting trees, and the body stock is fourteen inches at the grafted portion, and the black oak immediately above it at once enlarges to twenty-two inches."

The joining is perfect, and both above and below the limbs are true to the stock from which they spring. What freak nature performed in setting the graft is only to be imagined; its condition should admonish every one who owns fruit-trees to set grafts.

652. **Antiquity of Grafting.**—There is a style of grafting called the Aristotle graft, and also the Pliny graft. This shows the great antiquity of grafting. The Tschuda graft is another curious style of grafting, and by the process tomatoes are grafted upon potato vines, selecting stalks of the same size, and cutting both with a knife as sharp as a razor—sharper, if possible—the joining being bound together with a ligature, and the plant shaded until the two unite. It will then grow tomatoes above and potatoes below. An ancient writer speaks of grafting cultivated grapevines upon wild ones with success.

653. **Grafting Clay and Wax.**—Clay used to cover grafts is made by mixing one part of pure horse-dung with two parts of clay and a little plasterers' hair. It must be very thoroughly worked several days before required, and made very plastic when used, by heating and tempering.

Grafting-wax, which is made of three parts of beeswax, three parts of rosin, and two parts of tallow, melted together, and worked while warm by the hands in water, is much neater, and more convenient, and not much more expensive than clay, where only a little work is to be done. Where large limbs or wounds are to be covered, of course clay will be the cheapest.

Grafting-wax is sometimes composed of six parts rosin, one part beeswax, and one part tallow; but this, we should think, would be too hard for cool weather.

French grafting-wax is made of half a pound of pitch, half a pound of beeswax, a pound of cow-dung, boiled together, and spread on the graft, while hot, with a brush. Another sort is made of equal parts of beeswax, rosin, and turpentine (crude pitch), and spread on cloth or paper, to be used in strips wrapped about the graft.

The most common American grafting-wax, and the cheapest, and easiest remembered and made, is composed of rosin, tallow, and beeswax, in equal parts, melted, and worked in water; if it is needed of a softer texture, it is made so by increasing the proportion of tallow.

Prof. Mapes gives the following formula for making grafting-wax: Take Canada balsam one pound, clean beeswax one pound, and boil together and knead into a putty consistency, or keep in a kettle, to be warmed as wanted for use, and put on with a brush. It is very convenient, when spread thin upon cloth or paper, to be cut in strips for use, and its great advantage over any other material is that it will adhere to a wet surface. This is sometimes of great advantage, as the composition may be used to cover wounds in various plants.

654. **Preservation of Grafts.**—Grafts packed in pure sawdust of any sweet wood, it is said, will keep fifteen months. Moss for packing should be put

up slightly damp. Grafts set in crab-apple stocks, thorn stocks, or any other wild shrubs, generally produce one result—lost labor. The greatest advantage we ever found in setting grafts in such stocks was in preserving them over one season, in a new country, where apple stocks ordered failed to arrive in time to set the grafts.

655. **What Influence has the Stock on the Graft?**—Perhaps the only answer needed to this question is, "None whatever." And this is true, if the stock is of a character suited to grow the scion engrafted into it. An apple should be engrafted into a stock of similar texture to the scion to form a good tree. That is, a scion from a free growing tree engrafted upon a wild crab-apple may live, but it never will do well, because the graft outgrows the stock, but it has no influence upon the fruit. So it is with pears engrafted upon quince, which dwarfs the growth of the tree, but does not affect the fruit either in size or flavor, though the productiveness is increased; but that is owing to the obstruction in the descending sap when it reaches the stock, thus forcing more into the fruit-buds and limbs bearing fruit.

Another influence that a stock has upon a graft is to enable us to produce fruit from a semi-tender plant, by engrafting it upon a hardy native; as the peach upon plum or almond, the pear upon quince or mountain ash, or fine plums upon wild stocks, or foreign grapes upon native vines.

Make it a rule never to engraft anything upon a diseased stock; not that it is likely to influence the fruit, except so far as it will affect the scion and make it unhealthy.

It is asserted that a diseased graft will communicate the same malady to the stock, so that a shoot springing from the stock below the union will show the same symptoms that affect the graft.

656. **Budding** is a mode of engrafting which can be practiced after the season for grafting is past. The budding season does not commence until after the leaves have grown and the bark will slip. Then a bud of the present season's growth is neatly cut from a thrifty shoot, avoiding double buds, which are fruit-buds, and the leaves being cut off, leaving half an inch of the foot-stalk to hold the bud by, it is set in a slit made in the bark of the stock, by a T-shaped cut, and loosening up the edges with the flat bone handle of the budding-knife. Some persons remove the wood cut from the stick with the bud, and some insert it. After pressing the bud as far down in the slit as you can, cut off the upper end even with the cross-cut of the slit, and tie strips of soaked bass matting around to keep all snug. If the bud lives, it will look plump two weeks after it is set, and in four weeks will need to have the bandage loosened, or perhaps removed. Late buds may not have to be loosened till spring, and at that time the limb of the stock budded must be cut away, and the bud goes on to form a new limb, or the whole tree, if a single stock was budded.

Some trees do not grow buds as readily as others, and such may be tied with a band above and one below. The latter being first removed, allows the bud to grow, while the upper one checks the flow of sap up the stock two or three weeks longer. All buds must be watched and untied at the proper time.

Another method of budding is called annular budding, and consists in cutting two rings around the stock, and taking off a ring of bark, a quarter or half inch wide, and filling its place by a strip taken from a budding shoot containing a bud, which will grow if the bark adheres, which it is likely to do if carefully tied and the joints covered with wax or clay. This mode is sometimes practiced to save mice-eaten trees.

Many other kinds of trees and shrubs are propagated by budding, as well as fruit-trees.

657. **Use of Bass Matting in Budding.**—Bass matting is imported and used extensively in place of our native stock, we suppose, because people do not generally know how easy it is to prepare the bark for use. It is simply to take the whole bark of the bass-wood, or linden-tree, as it peels from the trees when the sap flows freely, say about June in this latitude, and sink it under water until the liber (inner bark) will peel and separate easily from the coarse bark. This soft, tough substance is then dried and stored away for future use, and the purposes to which it can be applied are almost numberless.

In budding it is almost indispensable, being one of the very best and cheapest articles for tying the buds in the stock.

658. **Uses of Shellac and Collodion in Grafting.**—Gum-shellac, or seed-lac, dissolved in alcohol, is kept constantly on hand by some orchardists, and used to seal the ends of cuttings or accidental wounds in trees, or to cover the stumps of large limbs pruned off at a time when they are liable to decay. The following method of preparing shellac is recommended as superior to that dissolved in alcohol, which will sometimes peel off.

Take an ordinary glue-pot, which is in a water-bath, and put therein one part of spirits of ammonia (hartshorn) and eight parts of water; bring them to nearly the boiling-point; put in shellac gradually, until the whole is about the consistency of varnish, stirring all the while; when entirely dissolved, take it from the fire, and continue stirring until it is cool; then bottle, and keep for use. This makes an entirely waterproof coating, and in summer pruning may be applied to the ends of the limbs with decided advantage.

For all trees that exude gum, like the cherry, peach, plum, and many forest and ornamental trees, it is extremely useful when applied to all wounds and cuts, as it keeps out the water and allows the wood to heal quickly.

Shellac can not be dissolved in water alone. The ammonia in the mixture dissolves it, and afterward evaporates, leaving nothing but shellac and water, which can not in any way be injurious. Seed-lac is about as good; it is certainly cheaper.

The above mixture forms an elastic covering, which is much better than shellac dissolved in alcohol. It must not be made in an iron kettle; it will not mix well. Use copper, zinc, or tin.

It is said that shellac may be dissolved in alcohol; then add water and boil till the alcohol is evaporated, and it will make a coating that will not peel off; but a solution of ammonia is undoubtedly best, and should be used whenever procurable.

Some persons paint the wound or cut with white lead in oil, which, if thickly applied, answers very well. So would a coat of tallow, or covering of clay. A coating of dissolved shellac is sometimes used in cleft-grafting large limbs, instead of wax or clay.

Collodion is made by dissolving gun-cotton in ether. It is sometimes called "liquid cuticle," as it may be spread over an abrasion of the skin and form a substitute, perfectly impervious to air and water.

This substance is excellent for all wounds, particularly slight burns, to shut out the air, and is invaluable and perfectly efficacious to prevent pits from small-pox.

In England it has been applied to the purpose of preserving cuttings of plants, by dipping the end in the solution, which completely shuts up the moisture in the wood, so that they are more than twice as likely to live as when left unprotected. It is an excellent thing to apply to wounds in delicate plants, is not very expensive, and is sold by druggists generally.

The *Imperial Journal of Horticulture*, Paris, gives an article upon a new mode of grafting or budding. This method may be employed at any time of the year, provided the buds are cut at the right season and preserved. A little piece of wood is taken off when the bark will not peel, and the bud fitted and sealed over immediately with collodion. None but large, strong buds should be used.

SECTION XXXVII.—APPLE AND PEACH TREES; THEIR GENERAL MANAGEMENT—CHOICE KINDS OF APPLES.

WHAT apples shall we cultivate? is a question of much importance. The short answer to this question, for farmers who grow them principally for their own use, and with a view to sell the surplus to their neighbors or nearest village, without making a regular business of putting up apples for market, is this: you should select such as will give you a succession of fruit, from the very earliest summer apple to such as will keep sound till July.

We can not give you a list that will suit all sections, but for the vicinity of New York the following short list has been recommended by a committee of gentlemen who gave the subject careful consideration, and who say:

"The chief object in making this selection has been to guard the inexperienced cultivator against the errors so often made when the lists of the nurserymen are the only guide. Many young orchardists buy everything recommended in the fruit-books and catalogues, and find, after years of careful cultivation, that a large portion of their trees are worthless, and the fruit of the remainder of but little value. Some fruits of the first consideration in one locality are worthless in another, and some trees are productive on one soil and barren on another.

"This frequently involves the necessity of regrafting, causing years of delay and labor without reward, until in many cases patience becomes exhausted. As an instance, the Virgalieu pear, in western New York and most of the Western States, is probably without a superior; while here and on the sea-coast generally, it is only an incumbrance to the ground. The same may be said of many other though less known varieties.

"In making this selection, we do not wish to be understood to discourage amateurs from planting any, or even all, the old varieties that the catalogues pronounce good, neither do we wish to discourage efforts to originate new kinds; but we do say, from our own experience, that, in this locality, we believe the list here recommended will prove satisfactory—that all these sorts, with proper cultivation, will be productive, and that none will require regrafting.

"Many persons will probably think, on reading this report, that better sorts have been omitted, and some of the committee will concur in this opinion; but they beg leave to say that while they have left out such fine varieties of apples as the Northern Spy, the Swaar, Pennock's Red, Newtown Pippin, Vandevere, Pearmain, Smith's Beauty of Newark, Hubbardstown Nonsuch, etc., all could not be included without making too long a list, and that some of them are only superior in their native localities. Some have been proved inferior here, and others have not yet been proved at all. The same may be said also of all lists of pears, plums, and other fruits."

659. **Select List of Apples.**—The following is their list of apples:

Summer Apples.—Early Bough (sweet), Early Harvest (acid), American Summer Pearmain, Summer Rose, Strawberry.

Autumn.—Autumn Bough, Gravenstein, Hawley, Fall Pippin, Porter, Jersey Sweeting.

Winter.—Baldwin, Rhode Island Greening, Jonathan, Monmouth Pippin, Spitzenberg (Esopus), Tallman's Sweeting, King of Tompkins County, English Russet.

The *Red Astraean* apple we consider one of the very best early varieties. The *Strawberry* apple is also a very choice one, and the most fragrant of all. Its peculiar aromatic quality and its beauty should commend it, even though it were not, as it is, an apple of most excellent flavor. We believe it is rather a shy bearer. The *Jersey Sweeting* we think one of the best sweet apples ever grown.

The *Vandevere* apple is a great favorite with some farmers. William Lawton, of New Rochelle, has a tree that is over 100 years old, perhaps 150 years, which bore, in 1860, at least twenty bushels of apples. The tree is still very healthy, and several feet in diameter. The branches have spread very wide and high. He also has a tree of the same age, very large, sound, and healthy, called the *Grandfather* apple.

The *King of Tompkins County* we suppose has been or can be overpraised, but it is a very good apple, large, fair, and of a mild, pleasant acid flavor. It is larger, more mellow, but less pungent than the *Spitzenberg*, which is our "king" apple. The tree is said to be a free bearer, and to have many other good qualities which we are acquainted with at second hand only. The apple is very showy, of a color shaded between red and yellow, and is said to have sold in New York at $6 to $7 per barrel. It will not supplant the established favorites, but we think it may wisely be tried along with them by those who may now or hereafter be putting out an orchard.

The *Northern Spy* is a very highly praised apple, and one that usually commands the highest price, but in this vicinity it proves a very shy bearer; so much so that we can not recommend it for general cultivation, though a most valuable apple, particularly in spring. It originated as a seedling in East Bloomfield, N. Y. The trees grow slowly, and only bear well when fully matured. They grow best upon clayey loam. The *Norton Melon* is another remarkably fine apple, which originated in the same locality. There is a great want of attention to the difference in soil in planting trees. What will succeed in one location utterly fails in others.

John Buckholder, of Adams County, Pa., sent us some specimens of an excellent apple, common in that section of the State, which is not known here. It is a medium-sized, red streak, roundish form, very white flesh, and delicious flavor, and is a good autumn apple, and keeps well in winter.

The *Gifford* apple ripens in harvest-time, and is of fine size and excellent quality. It is a variety not well known, but one highly recommended.

The following early apples are recommended by R. Peters, of Atlanta, Ga., as very well suited to that region:

Yellow May.—Size small, ripe the last of May; valuable for its being the earliest known variety. It is extensively grown in southern Virginia for shipment to the New York market. Tree a slow grower, but productive.

Red Astracan.—Size, medium to large; ripe early in June; an apple of great beauty and fair quality; valuable for market purposes, its crimson color and rich bloom making it very attractive. Tree, a good grower and productive.

Early Harvest.—Size, above medium; ripe early in June; one of our best early apples, of fine quality; valuable for the table and for cooking. Tree, rather a poor grower, but an abundant bearer.

Red June.—Size, over medium; ripe the middle of June; a well-known and truly popular Southern apple, valuable for all purposes. Tree, a fair grower, and a regular bearer.

Yellow June.—Size large; ripe from the middle to last of June.

The following are the names of Indian seedling apples which flourish at the South:

Tillaquah.—The original tree of this magnificent fruit is still growing some four miles from Franklin, N. C. It is so great a favorite with all who pass the road, that but few remain on the tree to thoroughly ripen. Its name signifies "big fruit."

Toccoa.—This apple was found in the orchard of Jeremiah Taylor, an old Revolutionary soldier living near the celebrated Toccoa Falls, in Habersham County, Ga. It ripens in August; is a very delicious, high-flavored fruit. Toccoa, when rendered in the English language, means "beautiful."

Cullasaga.—Is a seedling from the Horse-apple, raised by Miss Ann Bryson, who resides on the bank of the Cullasaga, or Sugartown fork of the Tennessee River, in Macon County, N. C.; is a very aromatic, early winter apple. Its name signifies "sweet water," or "sugar water," and is pronounced cullasajah.

Yahoola.—Was found growing on the banks of an old gold-pit near Yahoola Creek, a large stream in Lumpkin County, Ga., and was brought into notice by Wm. Martin, Esq., of Dahlonega, who informs us it is a desirable winter variety. The meaning of its name we do not know.

Chestoa.—Takes its name from its resemblance to a rabbit's head, being conical oblong in form, with one side near the calyx, jutting over the other like a rabbit's nose.

The *Bellefleur* in some localities is a very favorite apple, and in New York it always sells well.

The *Newtown Pippin* is one of the most favorite sorts grown by those who make a business of growing apples as a regular farm crop. It has been stated that Robert L. Pell, of Ulster County, N. Y., has 20,000 Newtown Pippin apple-trees. We have heard him say that some of his early shipments to England sold at $20 a barrel, and in New York frequently at $7.

Downing, in speaking of this apple, says: "The Newtown Pippin stands at the head of all apples, and is, when in perfection, acknowledged to be unrivaled in all the qualities which constitute a high-flavored dessert apple, to which it combines the quality of long keeping without the least shriveling, retaining its high flavor to the last. It is very largely raised in New York and New Jersey for exporation, and commands the highest price in Covent Garden Market, London. This variety is a native of Newtown, Long Island, and it requires a pretty strong, deep, warm soil to attain its full perfection, and in the orchard it should be well manured every two or three years. For this reason, while it is planted by acres in orchards in New York and the Middle States, it is rarely raised in large quantities or with much success in New England. On the Hudson, thousands of barrels of the fairest and richest Newtown Pippins are constantly produced. The tree is of rather slender and slow growth, and even while young is always remarkable for its rough bark.

"Fruit of medium size, roundish, a little irregular in its outline, caused by two or three obscure ribs on the sides, and broadest at the base, next the stalk; about three inches in diameter, and two and a half deep.

"Skin dull green, becoming olive green when ripe, with a faint, dull brownish blush on one side, dotted with small gray specks and with delicate russet rays around the stalk. Calyx quite small and closed, set in a narrow and shallow basin. Stalk half an inch long, rather slender, deeply sunk in a wide funnel-shaped cavity. Flesh greenish-white, very juicy, crisp, with a fine aroma and an exceedingly delicious flavor. When the fruit is not grown on healthy trees, it is liable to be spotted with black spots. This is one of the finest keeping apples, and is in eating from December to May, but is in the finest perfection in March.

"The Yellow Newtown Pippin strongly resembles the foregoing, and it is difficult to say which is the superior fruit. The Yellow is handsomer, and has a higher perfume than the Green, and its flesh is rather firmer and equally high flavored; while the Green is more juicy, crisp, and tender. The Yellow Newtown Pippin is rather flatter, measuring only about two inches deep, and it is always quite oblique, projecting more on one side of the stalk than the other. When fully ripe, it is yellow, with a rather lively red cheek, or a smooth skin, and few or none of the spots on the Green variety, but with the same russet marks at the stalk. It is also more highly fragrant before and after it is cut than the Green. The flesh is firm, crisp, juicy, and with a very rich and high flavor. Both the Newtown Pippins grow alike, and they are both excellent bearers. This variety is rather hardier, and succeeds best in the Eastern States. We have kept the fruit until the 4th of July."

Excellent, however, as this variety is, we would not recommend a farmer to plant a large orchard of Pippins unless he was so situated that he could ship the fruit to New York, because other sorts are more popular in other cities—the Baldwin, for instance, in Boston. Care must be taken, too, in buying trees, to get real Newtown Pippins, if that is the object, as there are about a dozen kinds of that name, one variety being strictly an autumn apple.

Probably the best plan to adopt in making a selection for a new orchard is to examine carefully what sorts succeed best in that vicinity, if there are any orchards of improved fruit—of various sorts—in the neighborhood, and if not, go where there are such upon similar soil to your own, similarly located as to hight, exposure, distance from water, salt or fresh, in great bodies, and all other circumstances calculated to influence the growth of the trees and ripening of the fruit, since it is a certain fact that kinds which succeed admirably in one place, utterly fail in others. We have seen some of the "Indian Apples," as the native sorts are called, growing finely in several of the Southern States, while those from the North failed entirely. As a general rule, in planting an orchard upon the rich soils of the prairies, we would select sorts of trees of the slowest growth.

An idea of the varieties of apples known may be gathered from the statement that the London Horticultural Society have nearly 1,500, and this of course does not include many of the seedlings of this country, where new sorts are constantly springing up, some of which flourish many years in the neighborhood where they originated without being known anywhere else. This is the case with the Kirtland apple, one of the best keeping apples of good flavor known to orchardists. It originated about the beginning of this century in Clinton, Oneida County, N. Y. The Baker apple is another in the same category; a large, handsome, red apple, of excellent quality, originating and known many years in Ridgefield, Conn., before it was heard of anywhere else. Indeed, there are numbers of such cases all over the country, besides the known varieties, which are so numerous that we can not say definitely what sorts shall be cultivated most profitably.

660. **The Use of Apples—Apples for Stock.**—The use of apples for food is hardly sufficiently appreciated. In short, no farmer can afford to do without an orchard that will furnish his family, including all his laborers, all that they can eat, because nothing that grows upon the farm affords such cheap food, nor anything that will keep his family in better health. Six months of the year we usually have baked apples upon our table every day, and almost every meal. Apples carefully dried and well cooked afford an excellent condiment for all meals, and apples cooked in almost any form really afford very hearty food. And who that was born upon, or even lived upon, a New England farm, in the "good old olden time," can forget the winter store of "apple-sauce," made of boiled sweet apple-cider, and partly sweet and partly mild, sour apples cooked in the cider, with quinces enough to give their peculiar flavor?

Apples for stock are not sufficiently appreciated. There is no feed that will make fatting pigs grow so fast as sweet apples or cooked sour ones, and if corn is fed a short time before killing, there will be no complaint about the pork not being hard.

In Westchester County, in 1860, the apple crop was very large; and as it had not been so before for many years, there was a scarcity of cider-mills, so that all the apples could not be ground up for that purpose, and many people fed them to cattle, and those who kept cows for milk-dairies found that apples increased the quantity very largely. It is probable that they would not much increase the product of butter. A milch cow will consume a bushel a day.

Farmers certainly do not consult their own interest while neglecting so important a source of profit and comfort as a good orchard. If your old one is not good, employ a grafter. If that is not convenient, graft them yourselves. You can do it, and by that means make that portion of land covered with fruit-trees a source of more profit, with less expense, than any other portion. You must keep trees sufficiently pruned, and now and then draw manure to the roots of the trees; and if they are not in a thriving condition, scrape the bark with a sharp hoe, and wash them with solution of potash or caustic soda, and do all that is necessary, and then it is easier to grow apples than wheat and corn. Let the hogs root around the trees; it will do them good, and is better than plowing, and it is much easier to feed your pigs upon apples than it is upon grain, which you can only grow by hard toil. Try it. Try also the value of apples fed to other stock. Even poultry will thrive finely upon boiled apples, with a very small quantity of grain or meal mixed with them. Try to get better sorts in your old orchards for eating or for selling. Even for feeding stock, it costs no more to grow good apples than it does poor ones.

661. **How to Grow Large Fruit.**—A friend in Illinois writes us that he grows apples of twenty ounces weight each. One man near Alton averages $1,500 a year, net income, from his orchards. Apples in that State generally grow much larger than the same sorts do in the Eastern States, and we have seen specimens from Oregon and California which show more than double the size of the originals. As this increase of growth is owing to the great richness of soil, it behooves us here to consider whether it would not be profitable to make the soil of our orchards better.

A correspondent of the *Gardener's Gazette* says fruits may be raised about one third larger than usual, of improved quality, by supporting them so they shall not hang their whole weight upon the stock, or twist about in the wind. When fruit is allowed to hang naturally, the increasing weight strains the stem and lessens the quantity of nutritious food flowing to the fruit. It may be supported either by tying to a branch with a piece of string, or by inclosing it in a small net. Flowers, such as dahlias or peonies, may also be rendered much larger by this system.

We do not suppose any one is going to adopt this plan upon a large scale, but he may do so very well with a few choice specimens for curiosity, if nothing more, and just to show how fruit can be made to attain a greater size.

662. **The Natural Form of Various Apple-Trees.**—The following statement about the natural forms of apple-trees comes from a committee of the Cincinnati Horticultural Society, which says:

"In ascertaining the habits of growth of various trees of the several popular varieties of apples that are largely cultivated in the neighborhood of Cincinnati, we have taken our own experience as a starting-point, and then added to this such additional information as we have been able to obtain from other members of this Society. The result of our labors is the following classification:

"*Of an Upright Conical Growth.*—Benoni, Early Strawberry, Golden Russet, Early Sweet Bough, Lady Apple, Pryor's Red, Northern Spy, Talman's Sweeting.

"*Of an Upright Growth, but with a Round Head.*—Red Astracan, White Pippin, Alexander Kaighn's Spitzenberg, Michael Henry Pippin, Drap d'Or, Bohannan, Belmont, Raules' Janette, Fall Wine, Rambo, Rome Beauty, Summer Rose, High Top Sweet, Myer's Nonpareil, Fall Pippin, and Porter.

"*With Spreading Limbs and Round Head.*—Smith's Cider, Maiden Blush, Baldwin, Roxbury Russet, Newtown Pippin, Tulpehocken, Winesap, Broad-well's Sweet, Gravenstein, Jersey Sweeting, Hubbardstown Nonsuch, Belmont, Vandevere.

"*Of a Drooping, Pendent Form—Head Symmetrical.*—Yellow Bellefleur, Pennock, Rhode Island Greening, Newark Pippin, and Fall Pippin.

"*Of a Pendent, Drooping Form—Head Loose, or Straggling and Open.*—Ortley, White Winter Pearmain, and Newtown Spitzenberg.

"Of the above, we would particularly refer to Smith's Cider, Yellow Bellefleur, White Pippin, Rome Beauty, and Raules' Janette, as trees of a marked vigorous growth and healthy, hearty habit. The Benoni, Winesap, and Summer Rose are of only moderate growth, but appear perfectly hardy.

"The Early Sweet Bough, Newtown Pippin, and Ortley (or White Bellefleur) appear to possess a less vigorous and a somewhat unhealthy constitution."

This valuable information should be remembered by all pruners.

663. **Dwarf Apple-Trees.**—When scions of the common apple are engrafted on what are called Paradise-stocks, the trees become dwarfish in growth. They thus form, when in a bearing state, very pretty objects in the garden, and they oftentimes bear more apples, in proportion to their size, than common trees of the same variety. As they are small, they can not of course produce a large crop, but are fine garden ornaments, combining both beauty and utility in a small compass, and will bear full, upon perfect trees not over two feet high, if the land is very rich, and rather moister than is suitable for apples. These dwarfs are made by grafting the crab scion in a shrub known as chokeberry. We would suggest, in addition to this, that the common thorn-bush, which grows about our pastures, would make a good stock to engraft the apple upon for dwarfing. The pear will grow well upon it, and the apple will also probably do pretty well. But the best way to get dwarf trees is to order them from an experienced nurseryman, unless you are a skillful grafter and would like to try your hand to see what you can produce for your own use.

664. **Peach-Trees—How to Plant and Treat Them.**—Peach-trees of one year old are the only ones that should be planted. Shorten their side branches to two or three buds, and the main stem one third; wash the roots clean and examine them carefully; see that you do not plant a peach-worm with the tree. Trim the roots and then dust them over with ashes. After the tree is planted, put a handful of ashes or lime around the stem on the surface of the soil; this will almost invariably prevent the peach-worm attacking the tree the first year; next year, put a little more lime or ashes around them, close to the bole, keeping the ground clear of weeds with the hoe or cultivator during the entire season. This is indispensable, and must not be neglected. Nectarines and apricots should be treated in the same way.

It requires more care than is generally bestowed upon the planting of peach-trees to insure success. Prof. Mapes says:

"In taking a tree from the nursery, I cut off all the limbs and set the tree an inch higher in its new place than it stood before. I shorten in all the limbs next year two thirds the length by cutting off always at a leaf-bud, and not a fruit-bud; and I let the trees branch from near the ground. Natural seedlings are longer lived than budded trees. It is positively necessary to disturb the ground as early as possible in the spring. All peach limbs should be shortened in so as not to be pendent. No organic matter will answer for peach-trees. Barn-yard manure will kill them. Nothing but inorganic manures will answer. Trees should be trimmed early in the spring, as soon as the weather is warm enough to make the limbs supple."

665. **Soda-Wash for Peach-Worms.**—These are frequently destroyed, or, rather, prevented, by using the caustic soda-wash—an application accidentally discovered by a New Jersey gardener, a few years ago, to be the best thing ever applied to kill insects and make smooth bark.

"This soda-wash is made as follows: Take common sal soda and put it in any old iron pot or other vessel, and heat it red-hot, and then put it hot into water—one pound to one gallon—and let it stand till cool, and use it with a brush or swab to the body or limbs of the trees you wish to clean, and it kills all insects it comes in contact with, and makes the bark assume a smooth, polished appearance. It will not injure any growing plants."

666. **Cutting out Worms from Peach-Trees** is a remedy somewhat like the Frenchman's flea-powder. The only easy remedy is boiling water. Put a cloth around the tree and pour boiling hot water on, and the steam will kill the worms. There is no difficulty in killing peach-worms in trees with hot water. It would not hurt the tree to apply a jet of steam direct to the worm-affected part, but it will hurt the worm. It would be impossible to pick out the worms in an orchard, such as some in Jersey, of 80,000 trees. The best cure for the yellows is to give the trees as vigorous a growth as possible, by the use of inorganic fertilizers.

667. **Winter-Killed Peach-Trees.**—The severity of some of the past winters has entirely destroyed all peach-orchards, even of twenty years' growth, far south of the center of Illinois, and committed great havoc in the apple-orchards. The same, or some other course, has produced a similar effect, we believe, generally, throughout the country. In the face of these inclement winters, trials have been successfully made to produce fruit-trees in Minnesota under otherwise unfavorable circumstances. Ought those of a milder climate to be discouraged on account of partial failure?

Let us notice some facts that favor the opposite opinion.

As far as the hardier and more valuable fruits are concerned, they are easily produced in central New England and New York, where the climate is colder and not so uniform, and the soil less friable than it is in many places two or three degrees farther south.

The Lake Ontario slope of western New York produced peaches abundantly before the country was laid open by the removal of the primeval forests, and is now one of the best fruit-producing regions on the continent, as it respects the really valuable fruits.

The cold snap of the winter of 1859–60 killed a great deal of fruit in the State of New York, but that should not prevent further trials.

C. Olney, of Pittsford, Monroe County, writes under date of Jan. 21, 1860:

"The peach crop in this vicinity bids fair to be almost an entire failure the coming season. I find more living buds upon trees that stand in the corners of the fences than upon those where the land was cultivated last season. On some of them nearly all are alive; on others, not more than ten feet distant, every one examined is dead. I am unable to say whether any particular variety escapes more than another, for I have only owned my present premises one year, and last season there was no fruit on the trees by which I could tell the varieties. My thermometer has only indicated four degrees below zero. Who can tell the causes of destruction, if it is true, as it has often been asserted, that it requires a degree of cold 18 degrees below zero to kill peach-buds?"

668. **Seedling vs. Budded Peach-Trees.**—A general impression prevails that seedling peaches are more hardy than those propagated by budding. This is true, though not in the sense in which it is generally received. The process of budding in no way changes the character of the variety budded, either for hardiness or otherwise. The fruit is no more liable to be killed by frost than the original seedlings from which the budded trees have descended.

All varieties were once seedlings, and it is said are improved from the bitter almond. This improvement is the result of cultivation, crossing, and hybridization. The pulp is merely the envelop or covering nature has provided for the protection of the seed. Hence the vital force is directed to this end, and the seed is consequently fully developed, and the product is hardy, and those varieties that are least removed from the original type are the most hardy. The improvement is the result of art, and so far as improved or removed from the state of nature, just in that proportion is it at the expense of the hardiness of the variety.

This fact holds good throughout all the departments of animated nature as well as in the vegetable kingdom. Compare the native Indian with the present cultivated races of mankind, also our races of domestic animals with those in the state of nature—how different is their character for hardiness! One characteristic of the peach is, the power of the different varieties to withstand the effects of cold according to the character of the blossoms. Some—and this is generally true with seedlings—have large blossoms, the petals of which afford a thicker covering to the embryo fruit; hence this class is generally most hardy, while those kinds with smaller blossoms are more tender, and others are still more so where the petals stand out, or the blossom is the least cupped.

It is only the improved kinds that are found most desirable to perpetuate by budding; these have become tender because they are improved and farther removed from the state of nature, not because they have been propagated by the artificial process of budding.

In our extremely variable climate the propagation of seedling peaches should be practiced to a greater extent than it is, but with more care and calculation. In selecting seed to plant, choose from the best of those kinds that have large blossoms, as well as others most hardy with smaller cupped blossoms. The yellow-fleshed peaches can be depended on with more certainty to produce their kind than the white-fleshed peaches. In some instances the seedlings may be superior to the parent; in more, they may be of equal quality, while a large proportion may be inferior; but as the inferior peaches are most hardy, these may afford us a crop, while the others or budded varieties entirely fail; so that where land is cheap or in favorable situations, we advise that calculations should be made to produce seedling peach-trees every year of the seed of the most improved varieties.

669. **Peach-Trees for Fuel.**—Peach-trees should be grown upon the prairies for fuel. No tree grows more rapidly, and no seed is more sure of germinating than the peach. The stones should be planted in the nursery, and the first summer's growth cut off two or three buds above the ground before autumn, or in time for the wound to heal and new shoots to start. The young trees may then be taken up and planted out ten feet apart in orchards. This mode of cutting back gives two to five trunks instead of one, which make more wood, and are less likely to be winter-killed. If the shoot is not cut back until the next spring, let the root remain another season in the nursery.

Another good way is to plant the stones in drills, ten feet apart, in the orchard, the ground to be well prepared, and the rows kept free from weeds by the plow. In the fall, turn a good furrow from each side against the rows, and level them, if necessary, with a hoe, and then mow off the shoots even with the ridge. Draw out, for planting the next summer in other places, the weakest of the plants, and let the others grow, heading back each year. In three years the trees will begin to bear, and those which do not promise good fruit may be used for fuel. Of course, the fruit is a secondary object, and all that is got is clear gain—as the trees are grown that fuel may be had at less cost and trouble than to haul it from a grove four or five miles distant.

670. **Manuring Fruit-Trees—Use of Hogs.**—There is no better manure for an orchard than swamp muck, composted with lime and salt—that is, lime slaked by a solution of salt. Wood ashes, leached or unleached, are also good, and we doubt not coal ashes are beneficial. If the land is in grass, it should be thoroughly harrowed in the spring, and again after mowing. Use the orchard in the fore part of the season as a sheep pasture, and graze close. When the apples begin to fall, turn in the pigs and let them eat the windfalls. Valuable trees, or those of delicate nature, will be highly benefited by mulching, both summer and winter.

The use of hogs in an orchard we have never seen so clearly demonstrated before as we did in the summer of 1862. The Shaker Society at New Lebanon discarded the use of pork and quit keeping hogs about 1860. From that time, an orchard that had been used as a hog pasture, declined in vigor and fruitfulness, and as the land could not be very well cultivated, it was determined to try the hogs again, and a number were purchased and set to work. In a few weeks, in pursuit of the worms, they had thoroughly rooted up the turf, and the effect upon the apple-trees was so visible as to be readily remarked by every one acquainted with their previous condition.

Autumn or early winter is a good time to manure fruit-trees, provided you do not use such as will harbor mice, for that will be likely to injure young trees more than the manure will benefit them. Ashes and rotten wood and leaf-mold are particularly good for trees, and so is any well-rotted compost. Spread it over as much ground as the top covers, and do not be afraid of putting on too much. A heavy-bearing tree, or one that you want to make bear plenty of good fruit, must have some food to produce it from; and a young tree needs as much cultivation every year as a hill of corn, and should have, in proportion to its size, about the same manuring. And there is no crop that will pay better for manure and cultivation than fruit of all kinds. It is the secret of peach-raising in New Jersey and Delaware.

671. **Lime for Trees.**—We have seen a statement that lime has been most successfully used in England in transplanting trees by mixing a small quantity—a quart or two—with the earth in which the tree-roots are planted. It serves a double purpose—assisting to keep the earth moist, and converting vegetable substances into food for the tree. The statement looks so reasonable that we advise its trial. The English papers say that every tree in a large plantation served in this way flourished finely.

We object to applying lime to trees in the form of whitewash upon the boles, but in no other way, whether liquid or powder.

Hon. John A. Clayton, late of Delaware, assured us that half a bushel of powdered lime applied close about each peach-tree was the best thing that he ever tried to promote health and increase growth. Whitewashing trees is not a good practice. Indeed, we know of nothing that can be said in its favor. Water, saturated with lime, used as a caustic wash, would be beneficial, while the lime itself, plastered upon the tree in the form of thick whitewash, would be injurious. It would be of far more use to the tree spread over the ground; there it would add to the nourishment of the tree.

Another benefit derived from the use of lime around fruit-trees, is the fact of its seriously affecting more or less all kinds of worms and insects that infest the apple-tree. Most of the vermin that annoy fruit-trees in the summer remain in the ground during the winter. A quantity of lime spaded in around the roots of the tree will have a good effect toward destroying the canker-worm, if applied in season, and a small mound of lime around the collar of the tree will prevent the ravages of the borer, which almost always enters the tree in the tender bark near the ground. It is beneficial on all soils, except, perhaps, calcareous ones; it will greatly assist in destroying all vermin that harbor in the ground under the tree; it is always injurious when applied to the bark, as it stops the pores and impairs the health of the whole tree.

672. **How to Renovate an Old Orchard.**—It may not always be practicable to renovate an old orchard with swine, as practiced by the Shakers, as mentioned in 670, therefore the following account of what a woman did is valuable.

Ruth H. Lynde writes us from New Bedford, Mass., as follows: "Some years ago I lived on a small farm in New York State, and one of the inducements held out for hiring it was, that there was a fine apple orchard of choice grafted fruit. This decided—but the trees were in a miserably sickly condition, and the fruit scanty and mean, knotty and wormy. In the fall, a circle was dug around every apple-tree nearly two feet from the crown and over a foot and a half in depth. Dressing from the hog-pen was put into each hole until within half a foot of the top, and anthracite coal-ashes spread over up to the crown. In the spring the trees were pruned, the orchard plowed, oats sown, and the crop of oats was fair; the trees bloomed more, but the fruit was scarce and still poor. That fall, after the leaves had fallen, the trees were scraped—the trunks, branches, and boughs—and the grubs scraped off that were in the loose bark sufficed to feed for two days a hundred fowls, consisting of turkeys, hens, and guinea-fowls. The fowls generally were in an inclosed place, and corn kept in a trough for their daily use; as the corn was untouched and the fowls healthy, my statement can be relied on. Next spring the orchard was a mass of blossoms, and so beautiful, I never wearied looking at it. The trees were so laden with fruit that two of them split in the fork, and a person could not walk upright under them. I never saw such quantities of fruit, and fine fruit, too—Bell Flowers, Fall Pippins, Seek-no-Furthers, Summer Pie-apples, etc."

The subject of renovating old orchards has been discussed several times by the American Institute Farmers' Club, and here are some of the facts elicited. We give them with the names of the authors for what they are worth, as they are all men of experience in fruit-growing.

Prof. MAPES—There was an old orchard on my place that had ceased bearing, which I fully renovated and afterward cut down, because I can not afford the shade. The land is too valuable to grow large trees upon. I can produce fruit upon dwarfs more economically. All old apple-orchards are deficient in lime, but the lime must be properly prepared to be of use. The caustic soda-wash, spoken of last week, will clear them of insects and fungi. I subsoiled the old orchard, which was in grass, and applied lime. I recommend ten bushels per acre, sowed in a caustic state on the surface. Lime is only soluble in large quantities of water. The next spring I applied phosphate of lime. This orchard was then in vigorous bearing, and had not before borne for years. The grass crop was also more than doubled. Run the subsoil plow up and down hill and it will serve to drain the land. I only run the subsoil lifter furrows some four feet apart, without disturbing the soil. Lime and manure should not be applied at the same time to orchards. The plowing is an important part of the treatment.

Mr. Vreeder, of Albany, said: A German, working for me, practices removing the earth from the apple-tree roots in the fall, and that has completely renovated an old tree on my farm. I have great faith in the value of cutting off the long runners of tree roots. I know one apple-tree that bore, two years ago, in Schenectady County, seventy barrels of apples.

Adrian G. Bergen said—I wish I could make the apple-trees on Long Island produce as they did thirty years ago. The trees have generally failed. I believe trees are failing all over the land. It is not all owing to want of lime. There is something besides this that affects apple-trees.

Andrew S. Fuller—I recommend renovating old trees to find how far out the roots extend, and would dig so as to cut off three or four feet of the out ends of all the roots by a ditch three feet deep and three feet wide, which I would fill with good soil and manure. It will almost always renovate them. If trees are mossy, scrape them with a hoe.

Thos. W. Field—I agree with Mr. Fuller in this recommendation.

Wm. P. Gates, of Windham, Ct., wants to know how to treat the soil in an old orchard, or where trees have been planted ten years. Plowing cuts and bruises the roots, and, he thinks, must injure the trees. How, then, shall the soil be loosened?

Judge French, of New Hampshire—We generally keep our orchards plowed two thirds of the time, and work the land at first as deep as possible. We do not think it good policy to ripen grain in an orchard. Sow with oats and cut them for green fodder. Plant with corn, and cut green. Potatoes are the best hoed crop for an orchard, old or young.

Thos. W. Field—I have been trying to answer this question a long time. Some orchards on Long Island that are plowed often, have ceased to bear, while trees in the hedges and walls continue to bear fruit abundantly. Some pomologists contend that orchards should not be disturbed by the plow. Trees derive very little nourishment from deep soil; it nearly all comes from the fibrous roots near the surface. If we can keep the surface loose, it will be useful; but plowing I believe injurious.

Prof. Nash, of Amherst, Mass.—I concur generally with Mr. Field in this; but for naturally drained land, I have no doubt it is the best practice to let the land lie in grass. No general rule can be given, but it must be adapted to the situation and circumstances of each orchard.

Robert L. Pell—My experience is, that all orchards require plowing. I have found roots in my orchards as large as my arm, extending fourteen feet deep. Rye will kill an orchard quicker than anything else. I never stop to inquire whether my plow is cutting the apple roots or not. It does not injure them.

Solon Robinson—I hold to the Scriptural injunction to renovate an old tree; it was: "Dig about and dung it." Success attends the same method now. Dig about certainly as far as the branches extend, but do not dig too deep or injure the roots unnecessarily. Stirring the surface soil frequently is what they want. Try that, and you will be amazed at the renovation you work in an old apple-tree. Mulching, or cultivating with a hoe to keep down weeds and let in air and moisture, answers the same purpose.

To clear suckers from orchard trees they should not be cut off, for new shoots will spring from every stub left. The right way is to keep the ground smooth, mellow, and clean; and then about the middle season of growth, or during the first half of summer, put on thick cowhide boots and stout buckskin mittens, seize one sucker at a time, placing the boot upon it close to the tree, give a sudden jerk with the hands, and it will be torn out root and branch, leaving no stump. An occasional repetition of this process will keep the orchard clear. Suckers always give a slovenly appearance to an orchard, and favor the depredations of the borer.

Trees growing on mucky soil sometimes make wood so fast that they appear to have no power to produce fruit. In such cases we recommend heavy dressings of lime, salt, and bone-dust, and if convenient, sand and clay. The debris of an old charcoal-pit or a brick-kiln would be beneficial.

When old pear-trees fail to bear, or, rather, to perfect their fruit, we would invariably dig about them and add all the above ingredients, and afterward stable manure spread on the surface as far around as the limbs extend, or farther, after having dug up the surface thoroughly. A caustic soda-wash, or a wash made of weak lye, or of a solution of two pounds of potash to eight quarts of water, and rubbed on the stems of the tree, will prove more beneficial and far less injurious than whitewash. There is probably no substance that can be applied at so small a cost as lime that will do so much toward the renovation of an old orchard. It will promote in an astonishing degree the flowering and fruiting of almost all plants, because calcareous salts promote evaporation and the concentration of the sap. Air-slaked lime is an excellent manure for fruit-trees as a top-dressing; or if spaded in around the tree, it will render it much more fruitful where the soil is not too calcareous by nature. In the use of lime, do not use it in great quantities, because only a small portion can be appropriated by the growing plants. Our opinion favors about ten bushels per acre, though many persons apply thirty bushels. We believe if that quantity were applied at the rate of six bushels a year fo· five years, it would be more beneficial, and we would always apply it on the surface either in autumn or spring, according to the crop, and not work it in. It will find its way down as deep as water can penetrate. The worst situation that can be selected for an orchard is a deep valley with a small stream of water, for there the frost is much more apt to kill buds than it is upon exposed hill-tops. This is not the case with the bottom lands of large streams, nor on the borders of lakes, or ponds of considerable size. Wherever fog follows frost, it will save the fruit from injury.

SECTION XXXVIII.—CHERRIES—BEST VARIETIES, SOIL, SITUATION, AND CULTIVATION—HISTORY, USE, AND VALUE OF CHERRIES.

THE cherry, as one of the fruits of the farm, is not appreciated as much as its merits warrant. The reason that farmers do not appreciate it is, simply because they do not know it. Not one farmer in a thousand, take the whole country through, ever had a tree upon his place that produced cherries of first quality, and not one in a hundred ever tasted of the best sorts; and some, we know, do not believe that cherries ever grow of such a size that it is necessary to "make two bites of a cherry," nor of such lusciousness that a family would sit down to eat and enjoy a dish of cherries as they would sweet peaches, plums, pears, or apples. The reason is, that their standard of opinion, of the character of cherries, has been formed from such as have been most generally cultivated, such as the Kentish, which is the old, common red pie-cherry, sour and bitter until very ripe; or the old-style Morello, or Cluster-cherry; or the old Black Mazzard, the Ox-heart, Red-heart, and Remington, etc., none of which are hardly fit to eat out of hand; and with opinions based upon such a standard, it is no wonder that cherries are not esteemed by some as worth the time and trouble of growing, which, however, is very small, for no kind of fruit is easier grown, and none will give a family greater satisfaction.

If any doubt this, we beg them to seek the opportunity of tasting some of the finest sorts in their perfection, a few of which we will name.

673. **Choice Varieties of Cherries.**—The *Bigarreau*, most generally known as Yellow Spanish, is in perfection the last of June, and is a most delicious fruit; the flesh firm, pale yellow, juicy, and rich, and grows very large. This cherry is often picked before fully ripe, and is not then esteemed. The tree is a thrifty, though not a large one, but forms a handsome head.

The *Napoleon Bigarreau* is also an excellent cherry, ripening later than the other, of very large size and firm flesh, so much so as to be urged as objectionable. The skin is pale yellow, or amber, when shaded, dotted with red, with a crimson-marbled cheek, very handsome.

The *Black Tartarian* is a superb cherry of large size and good flavor, and the trees are very productive, and of a remarkably rapid, vigorous growth, with crest head. The leaves are large and beautiful, and the tree very ornamental when full of ripe fruit, which is glossy-black, very rich and delicious, half tender, of a purplish color inside, with a very small stone, ripening from the middle to the last of June, and a few days after Mayduke.

Coe's Transparent is a great favorite with some persons. It is medium size, tender, melting flesh, sweet and delicate, ripening a little earlier than Black Tartarian. It is too tender for a marketing fruit, but very productive and worthy of cultivation for family use.

Downer's Late Cherry is valuable because it is late. It is an excellent fruit, and comes after the other good sorts are gone. The color is red, flesh sweet, and fruit grows in clusters.

The *Elton* is considered one of the best cherries grown. The trees are vigorous, with a singular mark of dark-red foot-stalks to the leaves. The fruit is large, with pale yellow thin skin, shaded on the sunny side with red; the flesh firm, and when fully ripe, tender and luscious, ripening middle of June

The *Governor Wood* is becoming one of the favorites of this country. Indeed, it is esteemed by some above all others. The fruit is large, light yellow, marbled with bright red, nearly tender flesh, sweet, juicy, rich, and delicious, ripening middle of June.

The *American Heart* is a tree of luxuriant growth, producing cherries in clusters, of pale red color, half tender flesh, very juicy, and sweet enough in dry seasons; ripens early in June.

The *American Amber* ripens the last of June, the tree vigorous and productive, fruit medium size, tender flesh, of a rather sharp flavor; skin thin, light amber color, mottled with red.

Downing's Red Cheek is a very handsome and very good new cherry, originated by Charles Downing, of Newburg, N. Y. The fruit is large, white skin, with crimson cheek, or rather side, for more than half is red. The flesh is yellowish, sweet, and luscious, and what is termed half tender, ripening about the middle of June. It will undoubtedly become a favorite.

The *Mayduke Cherry* is better known than some of the other good ones we have named. It is really the most popular sort known, as it thrives in all countries equally well. It is a good cooking fruit before it is fit to eat out of hand, and the fruit does not ripen all at once, some parts of the tree being several days behind others. The tree grows in a handsome, upright form, and fruit in clusters, roundish form, dark-red skin, reddish flesh, tender, melting, juicy, and good-flavored when ripe. It is too often picked before fully ripe. In favorable seasons it begins to color, about New York, the last of May, but is never fully ripe in that month; nor does it take its name from ripening anywhere in May, but from the province in France where it originated, named *Médoc*, which has easily been corrupted into Mayduke.

The *Late Duke* is of the same character, both in tree and fruit, except the period of ripening, which is the latter part of July, and the fruit hangs on during the first week in August. This is esteemed a very valuable variety, both for eating out of hand and for cooking.

The *Archduke* is another good sort, of the same general character belonging to the family of Dukes; the flesh is light red, rich and juicy, of good flavor, ripening the fore part of July.

Vail's August Duke, as its name indicates, is a later variety, but much like the Mayduke in other respects. The fruit grows large, heart-shaped, of regular form, and the tree is naturally prolific.

Prince's Duke, though large, good fruit, is not much cultivated, because the tree is such a shy bearer.

Jeffrey's Duke is a fine lively red cherry, with amber-colored flesh, rich and juicy, growing in thick clusters, the trees being of a slow growth, and therefore hardy and lasting.

The *Kentish Cherry* is one of the old English sorts, which has been extensively grown in this country near market towns on account of several good qualities as a marketing fruit. The tree grows pretty large, and is very productive. The fruit, though not ripe, is in the New York market from New Jersey in May, and continues through June, growing larger and better after it has turned quite red; and when fully ripe is a good acid cherry, of medium size, round shape, always growing in pairs. A peculiarity of this sort is the adhesion of the pit to the stem, which enables one to pull out the pit by the stem in preparing the fruit for cooking or for drying, for which purpose it is excellent.

The *Carnation Cherry* is much esteemed by those who preserve fruit in spirits, making excellent "brandy-cherries," and is also good for sweetmeats. The fruit is large and round, and usable when of a yellowish-white color, mottled with red, but is not ripe until nearly all red, and is then good for eating out of hand. The trees grow low and spreading, and bear well; the fruit hangs on long after it is ripe, which is about July 15.

Of the old variety of cherries bearing the appellation of "Heart," there are several worth cultivating, and we will mention one of each color.

Early White Heart ripens first of June, medium size, skin a dull whitish or yellow color, and not good to eat until fully ripe, when it is specked with red.

The *Black Heart Cherry* is an old variety, long grown in this country as a standard, on account of its fruitfulness and the large size and beauty of growth, as an ornamental tree. The fruit is glossy purple black when ripening, and dead black when fully ripe, of medium size, tender, rich, and sweet; in perfection the last of June.

The *Red Heart* is an old English sort, introduced into this country and much grown many years ago. It is dark red, with reddish flesh, half tender, and not half as good as many other sorts.

The *Honey Cherry* is a small, late variety, well worthy of a place upon every farm. It ripens the middle of July, and though small, the fruit is much esteemed, particularly by children, who love sweet fruit. One kind, called Sparhawke's Honey, is said to be a profuse bearer, and the tree more vigorous than the older sorts; and the fruit, which is lively red when mature, juicy and sweet, ripens in June.

The *Black Mazzard* is the parent of our extensive family of cherries, and is still adhered to by many farmers on account of its hardiness. It is the wild cherry of Europe, and has become semi-wild here, as it springs up almost spontaneously. The fruit is small, roundish, on long, slender stems, flesh soft and melting, but the juice slightly bitter, even when ripe, and acid when unripe. It hangs well on the tree till late in July.

Although we have not mentioned a tithe of the good cherries well worth cultivation, to make up a great variety, we have said enough, perhaps, to show readers how they can make up a little assortment of this excellent fruit, which should find a place upon every farm; and now we will name a few sorts that should find a place in lawns and yards, as ornamental trees.

674. **Ornamental Cherry-Trees.**—There is a variety of cherry-trees, bearing double blossoms, which produce no fruit, but are very ornamental in lawns or grounds about the dwelling.

The kind known as the Large Double-flowering cherry throws out blossoms an inch and a half diameter at the time of blossoming of other cherries, and being so showy is quite ornamental, although producing no fruit. The foliage is that of the common Mazzard, but the flowers bear greater resemblance to white roses than cherry-blossoms. The tree is a free grower, and forms a large head, so it must be allowed sufficient room. There is, however, a double-flowering cherry-tree that grows quite dwarfish—more like a shrub than tree—which is very pretty, though the flowers are not so large and regular as the Large Double-flowering variety, but it is better suited to ornament small places. There is also another kind, known as the Chinese Double-flowering cherry, that is medium between the large and dwarf sorts, which bears white flowers, tinged with pink, in fascicles and foliage, with cut edges, called serrulate, and is altogether an ornamental tree.

The Weeping or Ever-flowing cherry is a beautiful, small, ornamental tree, with slender hanging branches and myrtle-like foliage. It bears a red, acid fruit, which in favorable seasons continues a long time. If grafted on a Mazzard stock, five or six feet high, it grows into a sort of parasol-shaped top, the branches weeping half way to the ground.

The native wild cherries of this country are often grown as ornamental trees, but still more often are left to grow naturally about the fields and fences because they are ornamental, and form fine shade-trees, and afford a good deal of food for birds. The fruit is not much used to eat out of hand, but is to a considerable extent for making a poisonous decoction called cherry rum; poisonous, because the pits contain the essential principle of prussic acid. The variety known in New England as the "Black Cherry," which grows to a large tree in old forests, and to botanists as the *Cerasus serotina*, is the one we allude to. The *Cerasus Virginiana* is a low-growing shrub, which is quite ornamental both in blossom and in fruit. We have seen bushes only two or three feet high loaded with the shining, reddish berries. This variety is called "choke cherry" on account of its astringent quality, which makes it entirely unfit to eat, while the other, the common wild black cherry, may be, when fully ripe, eaten with satisfaction.

675. **Winter Cherries.**—We mention these in this connection simply because they have acquired the name of cherries among common people. They grow upon an annual plant (*Physalis viscora*) of the family of *Solanacæ*, and of course have no relation to the *Cerasus* family. The fruit has obtained the name of cherries from its appearance. It is of the same habit as the tomato; the fruit grows about the size of Mayduke cherries, of a yellowish or pale red color, inclosed in husks, or, rather, a thin, loose, skin-like semi-transparent covering, and it will keep till late in winter, if put away in its husks just as it grew. Some persons are very fond of these "winter cherries." To us they are sickish sweet, and totally unlike in taste to any true cherry. They can be grown wherever tomatoes can, and in the same way.

676. **Grafting and Budding Cherry-Trees.**—An experienced propagator gives the following rules for grafting the cherry:

"The trees should be taken up early in spring, before the swelling of the buds, the branches trimmed off and top cut back to within four or five inches of where the head is to be inserted. They are then to be planted in orchard or nursery rows, to be grafted as soon as the buds are ready to break and until the leaf is half grown, which is the season of grafting. The scions should have been cut in the fall or winter and kept in some cool place, so that they shall not have materially swelled their buds. If the stock is half or three fourths of an inch in diameter, cut it off at an angle of forty-five degrees, square off the upper part of the cut, and insert as in cleft-grafting, with this difference, that the knife is held at an angle so as to cut instead of splitting the bark; but when the stock is of less size, make the usual splice graft, but without the tongue, simply putting them together and winding with linen thread. Cut in lengths of sixteen to eighteen inches, and protect by melted wax, put on with a brush. So soon as the growth indicates that the thread will cut into the bark, it must be cut, and cutting down through the thread, even into the wood, will do no harm, but the thread should not be removed, as the wax will hold it so as to protect the graft from blowing off until it is firmly knit to the stock.

"Do not prune too much before grafting, nor cut back the branches at the time of grafting; they are to be shortened in, as the graft is capable of absorbing the sap. Those suitable for splice-grafting can be safely pruned at the time. The fault in grafting the cherry has been mainly in doing the work before active growth.

"Grafting the cherry and plum, even after they are in bloom, is safer than very early. The caution to be observed in rooted trees, is not to cut away too much of the top at once; and in newly transplanted trees, deprived of vigor and the growth checked, it is not safe to set the graft until the growth is resumed. No buds or sprouts should be rubbed or cut from the tree the first season after transplanting."

Most nurserymen prefer budding to grafting. They plant the common

Black Mazzard cherries to produce stock. The cherries are gathered when fully ripe, and allowed to lie in bulk until the pulp will wash off easily, and then the pits are planted at once about an inch deep in seed-beds. At a year from planting, set the plants in nursery rows a foot apart. The next August the plants will be in order for budding. When setting the plants in nursery rows, place all of equal sizes together, so that the growth will be even.

677. **Soil, Situation, Cultivation, History, and Uses of Cherries.**—Any rich, dry soil will grow cherries, but a sandy or gravelly loam or rocky situation produces the finest fruits. In wet soils the cherry-tree is apt to decay young; and if the soil is very rich, the young trees are apt not to ripen the wood and therefore winter-kill the ends of the limbs and make scrubby trees, or else produce more wood than fruit. It is well to set cherry-trees for fruit on northern exposures, wherever they are apt to start very early in the spring, as that is often fatal to the crop of fruit. This was almost universally the case in the spring of 1861 in the vicinity of New York.

Pruning cherry-trees should always be done in midsummer, and but little of it, only cutting out dead branches, or those that interfere. More harm is done than good, as a general thing, by pruning.

It is believed that our cultivated varieties of cherries came from Asia, first to Italy, and then to all other European countries. The name *Cerasus* comes from the name of the place they were brought from into Italy, more than half a century before the commencement of the Christian era. Our stock came over with the early immigrants from England, Holland, Belgium, and France.

As a dessert fruit, cherries are everywhere esteemed, and are better to eat out of hand than in any other way; that is, the varieties that are not only sweet, but lusciously so, rich and delicate, and the peculiar admixture of sugar and acid is exceedingly refreshing. Cherries are also excellent for culinary purposes, both fresh and dried. Some of the sorts are so particularly applicable to the purpose that they are called pie cherries.

In Europe, intoxicating liquor is distilled from cherries. In Germany, a very fiery stuff, called *kirschwasser*, is made of Black Mazzard cherries, ground, so as to break the pits, and the mass then fermented.

At Grenoble, France, a peculiar cordial is made of cherries, well known by the name of *ratafia*.

In Italy, a celebrated liquor called *maraschino*, is made by mashing a small Mazzard cherry and fermenting it with pulps, pits, and leaves mixed, to which honey is added.

In this country the common wild cherry, both the black and choke varieties, are used to make " cherry rum," which is done by filling a barrel half full of liquor, and then adding whole cherries to fill it, and bunging tight to stand a year or more.

The wood of the cherry is hard and durable, and when this country was first settled, and large forest-trees of *Cerasus serotina* were abundant, the wood was extensively used for furniture and house-joinery. One locality was so celebrated for the abundance and size of these trees that the town took the name of "Cherry Valley" (N. Y.), by which it will be known long after the origin of the name is forgotten.

The gum of the cherry-tree is much like the gum known in commerce as gum-arabic, and is much esteemed by some for its medicinal qualities, and is called rich in nutritive matter, though but seldom used for either of these purposes. The cherry tree does not exude gum in large quantities while it is in a healthy condition, and when it does exude copiously, it is generally a sign of final decay. It is recommended to cut out gum spots when they first make their appearance upon young trees, being careful to injure the bark as little as possible. We think it better to keep the bark clean by good cultivation and in a healthy state of growth. Trees may be much improved by washing with soda or potash solution. Sometimes trees are hide-bound, and are benefited by slitting the bark in midsummer. The boles of cherry-trees sometimes burst by freezing. When this happens, it is a good plan to pare the edges of the bark in spring with a sharp knife, and plaster the crack over with grafting clay (653).

Cherries and plums may be safely transplanted when they are two or three years old, but we prefer two-year-old trees to any others.

All of our stone-fruits are liable to produce gum from their wounds, and this often prevents them from healing over, and the older the tree the more liable it is to become diseased from its wounds. This can be seen by examining an old cherry-tree which has had a branch broken off; it takes a long time to heal over, if ever, while on a young tree it heals over quickly, scarcely leaving a sign of the accident.

S. N. Coats, in the *Gardener's Monthly*, says it is reported on good evidence that a cultivator of cherries has met with signal success by training his trees with low heads, and at the approach of winter bending down the lower tier of branches all around and covering them up with soil, having the position of the tree so that no water can stand about it. At the approach of spring he removes the soil, and the work is done. It is stated that not only the branches and fruit-buds covered by the soil, but those left exposed to the winter's cold, are perfectly preserved from its effects.

SECTION XXXIX.—PEARS—SOIL, SITUATION, CULTIVATION, AND VARIETIES.

PEARS may be named as the favorite fruit of mankind. Though not as universal as apples, nor quite as much sought after as peaches in their short season, they are everywhere appreciated as the best standard fruit we have, and in some of the numerous varieties having almost as long a season as the apple. The wonder is that farmers do not pay more attention to the production of such a rich fruit—one that is not only universally a favorite on account of its pleasant taste, but one that really affords a very cheap, healthy food, and can be grown near a market town as a profitable crop. At least, such is the opinion of a great many pear culturists, though some other persons declare that pears, as a general thing, can not be grown profitably. We think they can, and will try to tell how. In the first place, select good sorts. For a small assortment, suitable for any farmer, the following list has been recommended by a competent committee for the vicinity of New York:

678. **Varieties to Grow, and Cultivation.**—*Summer Pears.*—Doyenné d'Eté, Dearborn's Seedling, Beurré Giffard, Rostizer, Tyson.

Autumn.—Bartlett, Seckel, Beurré d'Anjou, Beurré Superfin, Doyenné Boussock, Duchesse d'Angouleme (on quince), Flemish Beauty, Fondante d'Automne, Speldon, Urbaniste.

Winter.—Beurré Gris d'Hiver Nouveau, Lawrence, Vicar of Winkfield.

Some of the committee were anxious to place the Beurré Bosc high on the list of pears, and if it was uniformly as good with others as it always is with Mr Hayes of New Jersey and some few other cultivators, it could with propriety head the list of late fall varieties. We recommend all amateurs to try this also, and if they succeed in bringing it to full perfection, they will have a pear in size, beauty, and quality inferior to no other.

In the second place, give your pear-trees deep, generous tillage, by which is meant a trenching and manuring of the soil from one and a half to three feet deep. In other countries, where labor is cheaper and fruits dearer than they are here, this work is often extended to a depth of four feet, receiving a profitable return even from so small a fruit-bearing plant as the strawberry. It is from a want of such cultivation that the finest pear-trees taken from our nurseries often die or come to nothing. They have "no deepness of earth," "no root," and, as a natural consequence, they share the fate of the wasted seed of the parable.

The following rules are also important:

1st. Cultivating or mulching the surface around the trees for a distance equal, at least, to the drip of their branches. But especial care should be taken to avoid the slightest bruising of the roots, and the mulch must not be so thick and heavy as to smother them.

2d. Under-drainage, wherever the subsoil is of a retentive nature. But all covered drains, whether of tiles or stones, should be not less than three feet deep—no less than six or eight feet distant from the trunks of the trees; for many a fine tree set out directly above a shallow underground conduit has been poisoned to death by the foul air therein contained.

3d. Thinning of the fruit, especially of the class of trees known as great bearers.

Pruning may be performed at any season of the year; but the best time is believed to be about the longest days of summer, while the worst effects that happen arise from using the saw or knife during the full flow of sap in the spring. An exception, however, must be made in cases where it is considered necessary to head in a newly planted tree.

As to the kind of soil, almost any thoroughly drained soil will answer, but a dry one is absolutely necessary. A true loam, or sandy one, if enriched, will answer a good purpose. A rocky or gravelly soil, fertile for grass and other farm-crops, is good for pears. A hillside is generally considered a favorable situation; and in all localities affected by late spring frosts, a northerly slope is recommended, on account of keeping back the buds, which are apt to start during early warm days in southern exposures.

679. **Rules for Pear Culture.**—A cultivator of pears in Missouri gives the following as his rules for pear cultivation. He says:

"In the fruit countries of old Europe, pears are generally more plentiful than apples, and easier to raise. They will not do quite so well here, but would do a great deal better if the following rules were observed, by following which I have no difficulty in raising sound trees that bear well, unless, perchance, a late frost or very heavy showers of rain injure the blossoms.

"1st. For position, I prefer the northern slope of a hill, otherwise the northern corners of a fence running west and east.

"2d. The soil should be rather heavy than light, yet permeable to a depth of at least three feet or more; not altogether wet, but not too dry.

"3d. The growth of the pear-tree should be only moderately rank; by the end of June the young shoots ought to cease growing. Do not manure your pear-trees nor stimulate their growth by much cultivation of the ground, unless they appear to grow too poorly. Do not stir the ground or remove the grass during hot and dry weather.

"4th. The lower the head is formed, the sounder the tree will be. Such varieties as the Seckel, growing in the shape of a poplar, might have their lower branches one and a half feet from the ground; others are best at three feet.

"5th. Bend the lower limbs toward the southwest, to make them fully shade the trunk and ground around it. If that can not well be done, cover the ground round the trunk with half-rotten straw, and keep the trunk enveloped with straw, rags, or even paper during summer.

"6th. Do not trim much; a bearing tree will generally help itself without much pruning.

"7th. In setting out your pear-trees, make a deep and wide hole, fill up with ordinarily rich ground, then plant not deeper than the young tree had been in the ground before.

"8th. Urine is good manure for pear-trees when applied in the winter time.

"Fine pears can be profitably raised at a dollar a bushel. Plant Seckel, White Doyenné, Napoleon, Bartlett, Beurré Bose, etc., all good bearers, and yielding delicious fruit.

"Thus far goes my experience in Missouri."

Thos. W. Field, of Brooklyn, author of a work on pears, says: "Near New York city we can not grow apples to any profit. So it is with every crop; it must be adapted to suitable soil and climate. Within fifty miles around New York the pear grows to perfection, with the exception of a few kinds. The pear-tree here has a great longevity. The peach is ephemeral. Apple-trees endure in a scraggy form, but unproductive. Cherries and plums are short-lived, while pear-trees are found everywhere about here of great size and age."

680. **Size and Improvement of Pears.**—The original pear, like the apple, was very unlike the improved sorts now known to us. Something like it may be seen here and there growing in a semi-wild state, called choke pears, a sort only eatable when cooked.

The pear has been a cultivated fruit a great length of time. It was so among the Romans at an early period—so history tells us; and it was also known to Syria, Egypt, and Greece. Pliny speaks of numerous varieties, some of which were, by his description, as delicate and agreeable as they are at the present day. There were also early and late pears, some of which were used for only baking. Probably the Romans did not better understand the art of ripening pears in a fruit-room than most of our farmers, some of whom have no idea that some pears, which are uneatable in autumn can be ripened artificially into perfect lusciousness.

We knew an instance illustrative of this fact. A pear culturist saw a farmer in New York market with a couple of bushels of "winter pears," which he recommended as "good for baking." Our friend saw at a glance what these "winter pears" were, and bought the lot at a very low price, because, as the owner said, "seems as though nobody wanted baking pears." He had, however, met with a customer who did, and who paid him a dollar a bushel and took them home and stored them in his fruit-room. In January following he brought them to a Broadway fruit-dealer, and sold them by count at a price equal to over $20 a bushel. So much for knowing what to do with choice fruit.

Pear-trees do not appear to be native to this country, though flourishing well in almost every locality, and sometimes attaining great age. The "old

Stuyvesant pear-tree," still standing at the corner of Third Avenue and Thirteenth Street, New York, has borne several crops of fruit since it attained the respectable age of two hundred years, having been planted by the old Dutch Governor Stuyvesant upon his farm, then a long way out of New York city, or rather the little hamlet that has since attained to its city dignity and size, and has absorbed the old governor's farm, and many others miles farther from the starting-point at the old Battery.

There is a remarkable old pear-tree near Vincennes, Indiana, on the other side of the Wabash. The trunk girts ten feet above the swell of the roots, and more than half that nine feet above the ground, and it has yielded one hundred and eighty bushels of pears in a single season, and every year gives a great product of early autumn pears of fair quality; some who never tasted better ones think them excellent. If the quality was like the Bartlett, Flemish Beauty, Seckel, or some other choice autumn pears, or Easter Beurré, Doyenné d'Hiver, Lawrence, Winter Nelis, or other choice winter pears, which often bring $5 to $10 a bushel, what an enormous money product this one tree would give its owner! And if other trees would not give as much, it is certainly for the encouragement of all farmers to plant pear-trees to know how long they will live, and how much they will produce in quantity and value.

In England, France, and Belgium, pears are largely grown for the same purpose that cider-apples are here, the fermented juice, called Perry, being much used as a beverage. The fruit is also dried, and extensively used as an article of food. It is so, to a limited extent, in some parts of this country; and so it is for cooking in various ways, and preserving in air-tight cans, but its great value is for a dessert fruit, and for this purpose none are suitable but those sorts having a soft texture and buttery, melting flesh filled with sugary juice and delicious aromatic flavor, of which we consider the Seckel the type.

681. **When to Gather and how to Ripen Pears.**—One of the most common mistakes with those who grow pears, particularly among farmers who have not, as a general thing, studied much upon the subject, is in letting the fruit hang upon the tree to ripen. With some of the best sorts of winter pears this is simply impossible, and with nearly all of the best varieties it is impolitic, because the fruit is far better when picked before it is ripe, and matured in the house. Of late many people have built fruit-rooms on purpose to ripen the choicest varieties both of pears and apples. Some pears that are almost worthless when allowed to hang upon the tree, are excellent when artificially ripened.

The time to gather pears which are to be ripened in a fruit-room, or in default of such a room, in a dry, sweet cellar, or in a cool upper room, may be judged by watching for the ripening of those which have been injured by worms and a few prematurely ripening specimens. Then all that appear full-grown may be gathered and placed singly on shelves, or on the floor of the room where they are to ripen. Sometimes the pears show maturity by a change of color, or by a disposition to fall from the twig upon a very slight touch. Then, if taken into the house, they will gradually attain their proper color, and will possess a richness never attainable on the tree. Pears ripened indoors will mature more gradually than upon the tree, so that you will have the fruit in perfection much later.

There is another important advantage to be gained by this indoor ripening. A thief will seldom strip a tree of hard, uneatable pears. He probably does not know the art of ripening them, and if he does, has not the conveniences. Besides, he has not the opportunity that the owner has to know when is the proper time to gather them. The owner may therefore frequently save the crop by his superior knowledge and ability to gather it while quite unfit to eat, and ripen it in a safe store-room.

Some of the latest winter pears, like late winter apples, should be allowed to hang as long as the state of the weather will admit. The finest sort for the table should be very carefully handled, and wrapped each in a piece of soft paper, and packed in barrels, or boxes of smaller dimensions than a barrel, and stored in a dry room—not in the cellar—just barely warm enough not to freeze, where they should remain till about two weeks before the time required for use, and then ripened in a warm room, keeping them covered to prevent shriveling. In this way some pears, that are naturally tough, become tender and delicious. When brought into a warm room to finish ripening, the temperature should be kept at about 60 or 70 degrees.

There are some pears that may be gathered and treated exactly like winter apples, and they will ripen just as well. The one called D'Aremberg is of this kind. The Glou Morceau, Columbia, Redding, Easter Beurré, Charmonte, and Vicar of Winkfield grow well near New York, and there is no difficulty in any farmer in Westchester County producing fine crops of these winter pears as easily as winter apples.

In sending pears to market, great care should be used in putting them up neatly.

A person who grows pears some distance from this city had a quantity of Louise Bonne de Jersey, which is only a second-rate pear, and he put them up in such a neat manner, one dozen in a box, that they sold at $5 to $7 a hundred. This shows how important it is to know how to put up fruit for market.

682. **Pears and Poultry.**—There appears to be a connection between pears and poultry which is worth inquiring about. Messrs. B. & S. Beatty, of Aurora, New York, have a very large poultry establishment; they fatten and prepare tons of poultry for market every year. Of course they have a good deal of the very best manure, the feathers forming no mean portion of it. They grow, probably in consequence of using this manure, remarkably fine, large, rich pears; and the richness of them is not the most remarkable thing, for some of the Seckels were the largest we ever saw, and were, they said, a fair sample of many grown on two standard trees, standing

near a stone ash-house, which consequently get plenty of alkalies. They are also dug around and manured.

Does the keeping of large numbers of fowls have a tendency to lessen the ravages of curculio? That is a question worthy of more attention.

683. **Pear Blight.**—That something to increase the production of this valuable fruit is worth thinking about is very certain. The greatest difficulty appears to be in what is familiarly known as *pear blight.* This mysterious disease of the pear-tree has, so far, baffled all the arts of pear culturists, and more than anything else has deterred men from extending their attempts to produce larger quantities.

684. **Seedling Pears.**—It is thought by some that if we should pay more attention to seedlings we should be more free from disease. Independent of this, there is great encouragement to grow seedlings, since some of our valuable varieties are such. The Tyson pear was found in a hedge near Jenkintown, Pennsylvania. It is thus described:

"Fruit small, roundish, pyriform, irregular; color yellow, shaded red to the sun, russeted, and numerous black specks; stem long, slender, inserted without depression; calyx large, in a shallow basin; flesh fine-grained, sugary, melting, aromatic; season, from the middle to the end of August. Mr. Barry believes it to be a cross between the Madeline and Seckel."

A remarkably good summer pear, brought into notice within a few years by Mr. Charles F. Erhard, of Ravenswood, opposite this city, on Long Island, originated from a small tree found in the woods and transplanted to the garden, where it fruited and proved one of the very best early sorts known. It is smaller than the Seckel, but nearly as rich, and is a summer pear, while that is an autumn one.

685. **Can Farmers Grow Pears as a Profitable Crop?**—Lewis F. Allen, of Black Rock, N. Y., has written a good deal in the *Horticulturist* and New York *Tribune* to prove the negative of this question. He is a well-known farmer, stock-raiser, and agricultural writer, and his opinions are entitled to respect. He says:

"There are some localities in the country where the pear once flourished, but now they have all, or nearly all, died out; and newly planted trees are refractory, or, if growing for a few years, then dying away, and proving an unprofitable object of cultivation.

"*Second*, There are certain localities in the United States where pears still appear to be successful; but those localities are limited in number, and no one disposed to embark in pear culture should do so unless assured, from a limited trial of his own, or the experience of others in that locality, that it is favorable to their growth and longevity.

"*Third*, The dwarf, or the pear worked on the quince to any extent, is a recent introduction in this country; and although millions of trees have been propagated and sold by nurserymen, pears are still scarce and dear fruit in market, and not at all abundant on the tables of their cultivators.

"*Fourth*, Although thousands of both, on their own stocks and on the quince, have been planted in my own vicinity, I do not now know of a single *orchard* of any size that has not proved a failure, so far as either profit or general success is concerned. Such is the experience, not only in my own neighborhood for many miles around, but in different parts of this and other States.

"*Fifth*, Some ten years ago, partaking of the enthusiasm which prevailed for dwarf pear culture, I planted out an orchard of about six hundred trees, together with a few hundred on their own stocks, or standards, on my Grand Island farm, situated in the Niagara River, and fronting it on the east, about four miles from the outlet of Lake Erie. The land has been recently (about twenty years) cleared from the original forest; well elevated (fifteen to twenty-five feet) above the water, gently declining toward the stream; rich in phosphates, a clayey loam soil, the best possible for both quinces and pears, each on their own stocks, and on which I had them, with many apple-trees, growing successfully for some years; the pear, however, with the drawbacks already named. On this pear-orchard site I had previously cultivated in succession good crops of corn, oats, barley, wheat, potatoes, sugar-beet, mangel-wurzel, beans, carrots, and parsneps. It was well surface-drained, naturally rich, and highly manured with barn-yard dung. I obtained my dwarf trees from several different nurseries—of a celebrated Rochester one among others, to the number of one hundred and fifty, certain, if not more, good-looking trees. Some of the trees were unpromising in appearance; some so-so; some very good; but such as they were, with a previous preparation of the ground with a well-cultivated potato crop, I planted faithfully and well, under my own immediate eye and hand. The trees were properly pruned and cut back, both at root and top, according to the authorities. The first year the trees, on an average, grew well, but few dying. The next year more died, which I replanted with new trees from the nurseries, some of them imported, and said by the venders to be better than those of domestic origin and growth. Some of the trees by this time bore fruit, fair in appearance and quality; and although I cultivated them well, and according to the books, they still continued to die. The cause of their death was an occasional 'fire blight' striking them promiscuously over the field, yet often by a sort of bark and leaf blight, or canker, appearing in black blotches, diseasing the bark, leaves, and twigs—at all events they died, although they were hoed repeatedly, and manure was forked in, and the ground turned up for several feet around their roots every year. In that orchard, although but of six hundred living trees at any time, I planted out about fifteen hundred while it lasted—that is to say, I replanted nine hundred to keep the orchard. Some of the trees, of the first planted, grew well, bore well, and flourished to the end. In short, they were a mixed-up collection of good, bad, and doubtful growth—all of the 'best' varieties in fruit, and dying out in about like proportions of the various qualities, in appearance of the trees as they came from the nurseries. To cut this long story short, after about eight years of this point-no-point experience, in the fall of

1855 the whole country became infested with myriads of field mice, and during the succeeding winter immense havoc was made throughout the nurseries and orchards by them, and they cut down nearly all my pear orchard, both dwarf and standard, and thus terminated my hitherto very doubtful labors in that line!

"Now whether, had the mice let my trees alone, I should have reached any final success, I do not know. I do not believe I should, judging by the practice and experience of my neighbors since. I sold and marketed a good many pears while my orchard existed; but the price I obtained led me to abate very much of my confidence in the public valuation of a good pear. Three dollars a bushel is the highest price I ever knew the best Bartletts to sell for. Virgalieus, which, by the way, are apt to crack and spot all over the country, are scarcely worth four to five dollars when good; and Seckels, the best of all, though inferior in size and appearance, bring no more, on account of their looks; and no better pears, in their season, than the above three, are grown.

"I have mentioned the apparent diseases which have killed the dwarf pears, both my own and those which I have observed in other grounds, with the exception that many of them blew down, being dislocated at the point of junction on the quince stocks. But the *gist* of the want of success in the culture of the dwarf, in my opinion, is this:

"*Sixth*, A want of compatibility in the open-pored, thrifty wood of the pear to unite with the close-pored, small wood of the quince. The pear, in its natural estate, is a large tree, growing, at full maturity, fifty feet high and two feet and upward in diameter. Consequently, when the pear is worked on the quince stock, and growing thriftily, as it does for a few years, it then demands more sap than the quince root and stock can furnish; it then stops growing at all, or the growth is feeble and sickly; and it is no secret to say that when a young tree of any kind lacks for nutriment, although it may, for such lack, go to bearing fruit, yet, if no young wood can be formed to still grow on to its natural stature, such tree must, in compliance with its physical nature, become diseased and die. It is an unnatural forced life which has been put upon it. Neither soil, climate, nor anything else which man can do, can long perpetuate its existence. And although extraordinary efforts or circumstances may prolong its life for a few years on the quince alone, unless it can strike its own roots from above the junction of the quince into the soil, so as to give it new expansion and support, it must die. The opposite formations and natures of the pear and quince refuse to join and become an inter-knitted wood, as the woods of two varieties of the same species, as the apple, pear, or quince, separately, will do when grafted or budded into each other; and thus the pear and quince, so worked, years afterward, in most cases, will be found to be only partially joined at the bark and a portion of the sap-wood, the body of the different woods still preserving their own different form and habit. An occasional exception may be found in the case of a small-growing, close-grained pear-wood worked on a very thrifty, open-pored quince, but rarely.

"And this I conceive to be the grand difficulty and cause of disease and death in the dwarf pear, and, of course, the want of success in their cultivation; for they have been years cultivated in ground immediately adjoining thrifty growing and bearing pear and quince trees, standing on their own roots, with not half the cultivation and pains given to the dwarfs, while the latter have become diseased and died. Now, if the quince would grow and thrive on its own roots and tops, why not on its own roots with a pear top, if my theory is wrong? Analogous to working the pear on the quince is the long-exploded practice of grafting or budding the pear on the common wild thorn. It used to be practiced in old times, when, for a temporary purpose, our farmers wanted a pear in shorter time than it would bear on its own stock. But although they succeeded for a few years, they were short-lived and unprofitable. The quince, although fibrous rooted and more tenacious of life than the thorn, and therefore easier worked and transplanted, I consider in the same category when permanent pear-orcharding is the object."

There are others who contend just as strongly that dwarf pears can be profitably cultivated; and one writer, who visited Mr. Allen's farm, insists that he failed because the orchard was located upon the bleak eastern shores of Grand Island, in the Niagara River, on a level, stiff agricultural clay that had never been under-drained, and probably, as it was recently-cleared forest land, never deeply plowed, and so full of water that mosses and coarse sedge grasses (*calex*) were found growing in the sod, and lichens upon the young trees, and the recently turned-up earth dried in the sun almost as hard as sun-dried brick.

Now let this fact be remembered by all who would grow pears, either as dwarfs or standards, that land naturally cold must be warmed; naturally wet, must be drained—not upon the surface, but three or four feet below; naturally stiff land must be ameliorated, and made as friable for pears as for garden vegetables; and land naturally poor will not grow pears any more than naturally rich land will that is suffered to grow weeds and grass till the life is choked out of the trees, or eaten out in winter by mice.

And let this other fact also be remembered, that signal failures have occurred, upon soil apparently suitable, with no lack of care and cultivation.

The above facts and arguments in opposition to cultivation of dwarf pears, or, rather, both dwarf and standard, may be all facts at Buffalo, and quite the reverse at Boston, as the following statement from that vicinity will show:

686. **The Weight and Culture of Dwarf Pears.**—"When we come to speak of luscious pears weighing from half a pound upward, we are conscious of presenting weighty arguments in favor of their culture. The merits of the little trees which load themselves with fruit when they have scarcely a growth shoulder high, are not appreciated by our farmers. If they were,

we should not see so many risking all their chances for fruit on standard trees that may bear in seven years or seventeen, as the case may be, when they could have it in three or four from dwarfs. It will be a novelty to most of our farmer friends, we presume, to learn that we have seen pears, enumerated in the following list, sold to rich people at one dollar apiece, and that it is quite a common thing for them to be sold at 18 to 25 cents each. This enormous folly does not result from the extreme tenderness and a necessary rarity of dwarf pears, but from the fact that the ease and profit of their production are not fairly known. Generally speaking, it is as easy to raise dwarf pears as apples; while their early fruiting, and the small garden space they require, commend them to the favorable notice of the smallest landholder. It has often been asserted, and as frequently denied, that dwarf pears weighing above three quarters of a pound are commonly raised. The Worcester (Mass.) Horticultural Society have settled the question by the aid of steelyards. They took the fairest specimens of several varieties shown at the fairs of 1850 and 1860, and found a marked difference in their weight in the two years. It appears that this year, in twenty-four specimens, the aggregate gain since the former year has been forty-seven ounces, or about two ounces to the pear. Of course, the remarkable increase is in part owing to a very favorable season, but probably much more to improved cultivation.

	Weight in 1850. oz.	1860. oz.		Weight in 1850. oz.	1860. oz.
Andrews	8½	7½	Duchesse	12	13½
Beurré d'Anjou	10	11¼	Easter Beurré	7	10
Beurré Clairgeau	12¼	14½	Fulton	4	5
Beurré Gris d'Hiver	7½	10	Flemish Beauty	12	13
Beurré Montgeron	5	6¾	Gansel's Bergamot	5	7¼
Beurré Bosc	8	9½	Glou Morceau	9	12½
Beurré Diel	11½	15	Henry IV	4½	5
Beurré Langelier	5	8½	Paradise d'Automne	5	6¼
Belle Lucrative	8	10½	Seckel	3½	4¾
Buffum	5	5½	St. Michael	6	6¾
Doyenné de Comice	6½	11½	Urbaniste	9	10
Doyenné Boussock	9	14	Winter Nelis	5½	5½

"Three varieties only of acknowledged merit were exhibited in 1860 that were inferior to the specimens of 1850, viz., Duchesse d'Orleans, Sheldon, and Zepherin Gregoire.

"The following is the weight of a few other leading varieties exhibited that year, of which no specimens were shown in 1850 worthy of particular notice. Several of them have probably seldom, if ever, been surpassed:

	oz.		oz.
Bartlett	12	Lawrence	6½
Beurré Nantais	8¾	Marie Louise	8¾
Beurré Superfin	13¼	Swan's Orange	14¼
Dix	9	Sieulle	9¾
St. Michael Archange	7½		

687. **List of Pears for Cultivation.**—We copy the following list from "Downing's Fruits and Fruit-Trees," as a guide for persons desirous of making up a good assortment, ripening in succession from harvest-time till spring, the winter pears, of course, being carefully stored for ripening.

"*Pears to Ripen in Succession from July to April.*—Doyenné d'Eté, Madeline, Bloodgood, Dearborn's Seedling, Beurré Gifford, Rostizer, Ott, Bartlett, Tyson, Osbands' Summer, Belle Lucrative, Flemish Beauty, Beurré Bosc, Doyenné White, Doyenné Boussock, Beurré d'Anjou, Seckel, Urbaniste, Church, Beurré Diel, Dix, Beurré Langelier, Lawrence, Winter Nelis, Beurré d'Aremberg, Beurré Gris d'Hiver, Nouveau, Easter Beurré.

"*Pears for a Cold Climate.*—Doyenné d'Eté, Bloodgood, Rostizer, Fulton, Heathcote, Buffum, Beurré Bosc, Flemish Beauty, Louise Bonne de Jersey (on quince), Belle Lucrative, Urbaniste, McLaughlin, Dix, Beurré Diel, Beurré d'Amanlis, White Doyenné, Lewis, Winter Nelis, Prince's St. Germain, Glou Morceau (on quince), Jaminette, Vicar of Winkfield, Doyenné d'Hiver, Nouveau.

"*Pears for Dwarfs on Quince Stocks.*—Belle Lucrative, Beurré d'Amanlis, Beurré Diel, Beurré Langelier, Beurré d'Anjou, Duchesse d'Angoulême, Doyenné d'Eté, Doyenné Boussock, Easter Beurré, Figue d'Alençon, Glou Morceau, Louise Bonne de Jersey, Napoleon, Nouveau, Poiteau, Rostizer, Soldat, Laboureur, St. Michael Archange, Urbaniste, Uvedale's St. Germain or Pound (for baking), Vicar of Winkfield, White Doyenné."

A list of pear-trees of fine appearance, of vigorous growth, of a natural pyramidal shape (or easily kept in that form), of good bearing disposition, with fruit of good or best quality; in a word, best adapted to a lawn or garden walk, where ornament and beauty are required, as well as the more essential qualities of a pear-tree, given by Louis E. Berckmans:

Beurré Langelier, Beurré Superfin, Belle Lucrative, Esperine, Fig of Angiers, Glou Morceau, Nouveau, Poiteau, St. Michael Archange, Urbaniste, Vicar of Winkfield, Andrews, Buffum, Belle Epine, Dumas, Capsheaf, Frederika Bremer, Kingsessing, Lawrence, Onondaga, Oswego Beurré, Sterling, Walker.

With the above lists always at hand for reference, no one can be at a loss what to select so as to make a good assortment either for family use or to grow as a crop for market. If you have room for only one tree, you may safely choose the Bartlett. For a second sort, take the Seckel. The best early pear is the Rostizer, and perhaps next best, Dearborn's Seedling. The Flemish Beauty is an excellent pear, and the trees hardy, and good bearers. Winter pears will not give as general satisfaction to farmers as summer and autumn ones, because they really require a good deal of skill and experience to ripen them to perfection.

SECTION XL.—PLUMS, NECTARINES, APRICOTS, MULBERRIES, AND OTHER FRUITS—TRANSPORTING FRUIT.

THE parent of our cultivated plums came from Asia and the south of Europe, and as this fruit has almost ceased to pay for cultivation on account of disease and insects which infest the trees, it is matter of interest to inquire whether we should not look to the sorts native to American soil and flourishing in a wild state from Maine to Florida, and up to the Lakes and over the Rocky Mountains. There are three principal varieties of wild plums in this country, all of which are good, though not as good as the improved sorts in cultivation. They are named and described by Downing as follows:

"I. The Chickasaw Plum (*Prunus Chicasa*, Michaux). Fruit about three fourths of an inch in diameter, round, and red, or yellowish red, of a pleasant, sub-acid flavor; ripens pretty early; skin thin. The branches are thorny, the head rather bushy, with narrow lanceolate, serrulate leaves, looking at a little distance somewhat like those of a peach-tree. It usually grows about twelve or fourteen feet high, but on the prairies of Arkansas it is only three or four feet high, and in this form it is also common in Texas. The Dwarf Texas Plum, described by Kenrick, is only this species. It is quite ornamental.

"II. Wild Red or Yellow Plum (*P. Americana*, Marshall). Fruit roundish oval, skin thick, reddish orange, with a juicy, yellow, sub-acid pulp. The leaves are ovate, coarsely serrate, and the old branches rough and somewhat thorny. Grows in hedges and by the banks of streams from Canada to the Gulf of Mexico. Tree from ten to fifteen feet high. Fruit ripens in July and August.

"III. The Beach Plum, or Sand Plum (*P. maritima*, Wang). A low shrub, with stout, straggling branches; found mostly on the sandy sea-coast from Massachusetts to Virginia, and seldom ripening well elsewhere. Fruit roundish, scarcely an inch in diameter, red or purple; covered with a bloom; pleasant but somewhat astringent. Leaves oval, finely serrate."

688. **Soil, Climate, and Cultivation for Plums.**—That the soil and climate are well adapted to the growth of cultivated plums is fully proved by the natural growth of these wild sorts, and if we could get rid of the enemies of the plum, we could raise all that could be eaten fresh, and a great surplus for use dry, or for exportation in the form of what are called "prunes"—that is, dried plums.

Unlike pears, plums should be fully ripened on the tree, whether for cat-ing out of hand, or drying, or making into sweetmeats. For drying, the plums are halved, the stone extracted, and the fruit dried in the sun, or in slow ovens, or a drying-room. See 349.

Prunes are largely imported into America, principally from France, the best coming from the neighborhood of Tours, made of the St. Catherine plum, and Prune d'Agen, and Perdrigon Blanc, the Brignole, and Prune d'Ast. The plums are allowed to ripen on the trees until they will fall upon being lightly shaken. The plums are laid upon wicker-work forms in the sun several days, which softens them, and then shut up in a spent oven twenty-four hours, and then taken out and the oven re-heated, and as they are now considerably dried they will bear a greater heat, and this is again repeated with increased heat. What is termed "rounding," which gives the prunes of commerce their particular form, is done after drying, though while still soft, by turning the pit half round by the fingers, without breaking the skin, and pressing in the long ends by a pinch between the thumb and finger, after which they are dried and packed.

In picking the finest kind of plums for the table, the French are very particular not to touch the fruit. Each one is broken off from the twig by the thumb and finger, and laid upon vine-leaves in a broad basket, so as not to touch each other. Care is taken to pick them a day or two in advance of using, and the early morning hour is selected, so as to preserve the bloom. In the fruit-room they grow mellow and attain the highest perfection.

The propagation of fine varieties is generally rather difficult, except by experienced nurserymen. The pits of wild plums, or those of any free-growing sort, are planted while fresh in beds (damsons are not free-growing), and the next year the largest plants are transferred to nursery-rooms, first reducing tops and the tap-roots. The following July these may be budded. Insert the buds on the north side of the stock, and tie light, and do not be disappointed if half do not grow.

Plum-trees require but little pruning, but the fruit is always improved by thinning out.

The best soil is rather a heavy loam, and the trees flourish well upon the banks of ponds and streams, and some suppose that in such situations the fruit escapes the curculio. It is a general opinion that curculios are much more troblesome on sandy soils than upon soils of a more compact nature; and it is asserted by some that a close pavement under a plum-tree is the best remedy for this pest.

One of the best manures for plum-trees is salt-water marsh-mud. In the absence of such, the mud of a fresh swamp may be beneficially used, with an addition of salt, at the rate of from half a peck to a peck to each tree. This should be applied in winter or early spring.

Seedling plums of such rare excellence have been so often produced, that we recommend every one who succeeds in growing them to plant every year a few seeds, and nurse the plants up to a period of fruit-bearing.

It is possible you may get a seedling not only of good quality, but one not so liable to be destroyed by the little beetle called plum-weevil, or curculio, against which no certain remedy has been discovered, though several "infallible" remedies have been from time to time published, the best of which is to spread a sheet under the tree, and then by a sudden jar, as by a stroke of a mallet, shake down the insects, and gather and burn them. This remedy, to be effectual, must be continued every day for at least a month, and perhaps all the months of May and June.

Making the plum-orchard a pig and poultry-yard in the same inclosure is recommended as one of the best preventives of curculio.

Covering the ground with a thick coat of clay mortar, and picking up all the fallen fruit and destroying it, is highly recommended.

Lime and sulphur is another remedy. To a barrel of whitewash add eighteen double handfuls of sulphur, and apply the liquid with a syringe to the trees as soon as the fruit is set, and continue to apply it every two or three days for four or five weeks.

The black knot, which so disfigures plum-trees, it is pretty well settled, arises from this same insect, so that any remedy that will save the fruit will also prevent the appearance of the black knot.

689. **Selection of Choice Varieties of Plums.**—The list of really good plums has become so large, that one needs some guide in making a selection. The following list is given from good authority (Downing):

Rivers' Early Favorite, Green Gage, Imperial Ottoman, Jefferson, Lawrence's Favorite, Purple Favorite, Purple Gage, Coe's Golden Drop, McLaughlin, Imperial Gage, Howard's Favorite, Prince's Yellow Gage, Prune d'Agen, Reine Claude de Bevay, Schuyler Gage.

The most popular, and for substantial reasons, of all the list is the Green Gage. It is high-flavored, and everywhere esteemed. It is one of the old sorts, having been named Queen Claude, in France, in the reign of Francis I., say about 1520. It took the name of Green from its color when ripe, and Gage from an English family of that name, who introduced it from the gardens of the monks of Chartreuse. It afterward acquired the title of the "Best Plum in England." The fruit is hardly medium size, round, with a yellowish-green skin, often dotted red at full maturity. The suture is faintly marked, the stem slender, slightly inserted, less than an inch in length. The flesh of the plum is also of a pale-green color, and separates freely from the stone, and is juicy, melting, luscious, sprightly, and ripe in August.

There are many seedlings of the Green Gage, none of which are superior to the original.

Some of the other favorites named in the list are larger; for instance, the Golden Drop, which is a very large plum, oval-shaped, and yellow inside and out, and of a rich flavor, ripening here the last of September, and not sure to ripen much north of this.

The Jefferson plum, which originated with Judge Buel, at Albany, is one of very large size, and of such excellent flavor that none but connoisseurs would be able to say it was inferior to the Green Gage, and on account of its superior size it is always more attractive. The skin is golden-yellow, with purple-red cheek, and flesh deep orange, parting freely from the stone, and rich, juicy, luscious.

690. **Grafting Wild Stocks.**—This is worth while in many places where wild stocks are plenty. In the report of the Wisconsin Fruit Growers' Association, John C. Kanouse gives his experience as follows upon this subject:

"1. Grafting English plums upon native sorts renders them much more hardy and less liable to injury by our severe winters.

"2. They will fruit from two to three years earlier than when grafted on the English stock.

"3. The fruit is less liable to injury; the crop more certain.

"This practice has one disadvantage, viz., the tree will be somewhat dwarfed. This can be remedied by planting more of them. My method of cultivation is as follows—

"Early in the spring I go out in the forest and take up the native plum, about one inch in diameter, being careful to take as much of the root as possible uninjured. Cut off the tops, then take the roots home; then, with a fine saw, take off the body about an inch above the roots, insert the scion, and then set them out where I intend to have them fruit. The scions should be of the present year's growth, and one of the buds must be under the ground. If the scion dies, still the root is sure to sprout, and then you can bud the sprout the next year. If you desire fruit the second year from the scion, select large trees, take them up with great care, and graft in the top; but these you will be likely to lose with high winds, etc., and yet this practice will abundantly repay any man on a new farm. By staking the scion he may have fruit for two or three years, and then his others, grafted at the ground, will take their place."

691. **Apricots.**—We do not recommend this fruit for general cultivation by farmers, particularly where they fail with peaches and plums; for there they would surely fail with this more delicate fruit. The apricot-tree grows handsomely, twenty feet high, flowering very early, and is highly ornamental in flower, foliage, and fruit. It is hardy enough to produce fruit below 42°, if the insects would allow it. The fruit is smooth-skinned, and peculiarly attractive to curculio. The color when ripe, at midsummer, is a beautiful ruddy gold. It is quite delicious, of a peach flavor, and, ripening between cherries and plums, would be very acceptable. In countries where it does flourish it is used for a dessert fruit, and for sweetmeats, and preserved in spirits, and also for drying.

It is generally propagated by budding on plum stocks, though many good seedlings are grown, which appear to be more hardy and productive than the finer sorts which have been imported. It bears fruit in the same way as the peach, and may be treated in the same way, though it is more commonly grown as an espalier, trained upon a trellis or brick wall. It should not be exposed to the morning sun, for fear of encouraging the buds to start too early in spring. The apricot is a very common fruit in Arabia, China, Japan, and other Eastern countries, and would be here, if we could get rid of the destructive curculio.

There are about twenty named apricots grown in this country, out of which you may select the Large Early, the Breda, Peach, or Moorpark for family use; or if your situation is pretty far north, take the Red Masculine, Roman, and Breda; but do not think of getting a crop without a continual fight for it with insects.

There is a double-flowering apricot used for an ornamental tree in Europe, but not very common in this country. There is another that is grown for its ornamental fruit, which resembles a small, yellow plum, growing very abundant, in clusters.

692. **The Nectarine,** an India fruit, is simply a wild variety of peach, growing small and smooth-skinned, of a piquant flavor, exceedingly liable to be destroyed by curculio, but is a very popular dessert fruit, when it can be produced, from its beauty, being of such a wax-like appearance. The tree grows anywhere that the peach-tree flourishes, and if the fruit is not destroyed, there is no trouble in getting as certain crops of nectarines as of peaches, and the culture is exactly the same.

The Early Violet, Roman, Boston, New White, and Hardwicke's Seedling may be taken as a good assortment for a garden.

693. **Mulberry Fruit.**—A new mulberry has fruited in England, which is called the "Synion Sweet White Mulberry," that is very highly spoken of, the berries being very sweet, and growing as large as the common black mulberry, this being of a pearly white. The foliage of the tree is also said to be very beautiful.

The tree may be beautiful, but if the fruit is better than "Downing's Seedling Mulberry," it is remarkable, for that is very richly worth cultivation, being very fruitful, and bearing a long time. The fruit is much richer than the fruit of the common purple or wild mulberry, and more than twice the size, and it is really a very pleasant fruit to eat out of hand, and it possesses excellent qualities for cooking—in a pudding, better than any other berry. The tree grows in quite an ornamental form, with rich foliage, and when filled with its purple fruit is beautiful.

694. **Pawpaws.**—It is a wonder that pawpaws are not cultivated, or at least preserved from annihilation, in the great regions of the West, where they were found growing wild in great abundance. The fruit is sometimes called the American custard-apple, on account of its resemblance, when perfectly ripe, to a rich custard, as the mellow pulp within a tough skin is opened to view.

Pawpaws are a feature of the St. Louis market; huckster-stalls and fruit-shops all having them for sale in abundance. They are nearly, if not quite, as good as bananas. Some people prefer them to bananas, or even any other fruit. We think they could be grown in any garden south of lat. 41°. They flourish best in shaded places, upon rich bottom lands of Ohio, Kentucky, and other Western States. The natural growth is about as large as quince bushes, usually branching in several shoots from one root, and in appearance are not unlike a bunch of young chestnut sprouts around an old stump.

695. **The Mangosteen.**—This is the name of a tropical fruit that has been lately perfected in English hot-houses, and is attracting some attention in this country, on account of its very peculiar character, it having a thick, succulent rind that is so astringent that it is used as a medicine for dysentery, and which exudes a yellow gum in wet weather that resembles gamboge. The fruit is of a spherical form, of the size of an orange; when young it is of a reddish green color; when ripe, of reddish brown; and when old, of a chestnut brown. The pulp has a snowy whiteness, melting in the mouth, with a refreshing, delicious flavor. The seed-lobes separate like those of an orange.

696. **The Jujube Fruit.**—This is another tropical fruit, though it has been grown in Georgia, and may become acclimated farther north. The fruit resembles a plum, and, although not so much prized as a dessert fruit, is considered valuable where it grows, because it furnishes the material for the well-known jujube paste.

The seeds were imported from the south of Europe for experiment in the Southern States. The tree grows in the form of a shrub of middle size, bearing a red, oval fruit, about as large as olives, inclosing a stone of the same shape. The fruit is sweet, but not eaten among us out of hand. In Algiers the fruit ripens in the month of June, and is much sought after by the inhabitants, who consume large quantities, both fresh and dried, as well as in the form of a delicious paste.

697. **Small Fruits for Field Culture.**—What we have said in Section XXXIV., about the cultivation of blackberries, raspberries, strawberries, and cranberries, is applicable in a general sense to their more extended cultivation in large fields, as a farm crop, where the farm is situated within easy reach of a market. What the distance must be to bring it within easy reach of market depends entirely upon the facilities of transportation. We will state a few facts which will enable readers to judge for their particular cases, whether they can send their fruit to a city market.

For a number of years previous to the rebellion, the New York market was regularly supplied with strawberries from Norfolk, Va., *via* Baltimore, and by steamers direct. For several years, strawberries have been sent to New York from Albany; and the present year, from Pittsburg, a passage of 18 hours by rail. This is the longest transportation of such a tender fruit within our knowledge.

Every year of the last five or six, since people learned that it could be done, blackberries and raspberries are brought from 50 to 150 miles by rail to this market.

Grapes, if properly packed, may be transported still greater distances, as peaches, pears, and other perishable fruits are. The greatest difficulty in all transportation of fruit is in its preparation.

In no art are we more deficient than that of packing fruit so that it may be carried a long distance without injury. Three fourths of all our summer fruits sent to market any considerable distance are more or less injured. Indeed, much that is brought to cities by growers only a few miles distant is scarcely fit for sale. Occasionally fruits are sent us, with a request to exhibit them at our horticultural shows, but in most cases the specimens are so injured when received as to be entirely unfit to show.

698. **How to Pack Fruit for Transportation.**—As no person can enter into the business of field culture of small fruits with any hope of success, unless he fully understands the art of transportation, we will give some general rules; and first those adopted by Mr. Kidd, gardener to the Marquis of Breadalbane, who sends fruit and flowers from the garden near Hampton Court, England, to the Highland residence of the Marquis, subject to 500 miles' carriage; yet his method of putting them up insures their safe transportation and arrival in almost as sound and fresh condition as when first gathered. Ripe tomatoes, for instance, which are as difficult as almost any article to transport, arrived in a perfectly sound condition.

He gives his method of packing fruit as follows: "I have found no better method in all my experience, which has extended over a period of twenty years, with all kinds of fruit, varying in distance from 50 to 500 miles. It simply is—box, soft paper, and sweet bran. A box is chosen, in size, according to the quantity to be sent. A layer of bran is put at the bottom; then each bunch of grapes is held by the hand over the center of a sheet of paper; the four corners of the paper are brought up to the stalk and nicely secured; then laid on its side in the box, and so on until the first layer is finished; then fill the whole over with bran, and give the box a gentle shake as you proceed. Begin the second layer as the first, and so on until the box is completed. Thus, with neat hands, the bloom is preserved, and may be sent to any distance; but with clumsy hands, quite the contrary, and often an entire failure, as the putting in and taking out of the box are the most important points to be observed. I have, invariably, packed sixty or eighty bunches of grapes and fifty or sixty dozen of peaches or apricots in one box, and received letters from employers to say that they have arrived as safe as if they had been taken from the trees that morning."

We commend this plan to all fruit-growers in this country.

A *fruit-carrier* was patented a few years ago, which appears to us like a useful aid to the transporters of tender fruits. A frame of any given size is made to surround the box or crate containing the baskets of fruit, say about eight inches larger than the box. In this frame the box is suspended by gum-elastic straps, which sustain it in the air, never touching any hard substance, bottom, or sides. To illustrate: Take the frame of the lower part of a common kitchen chair, without the bottom, and a box, the cube of which is some inches less than the space within the frame, and suspend that by two strings from the top round upon each side, and then attach two other strings to each side of the box and the lower rounds. Now place something in the box, and take hold of the frame and shake it, and you will see that the jar is far less upon the articles in the box than it would be if the shaking was applied directly. With such an easy carrier as this, and such packing as Mr. Kidd recommends, we believe that the softest fruits might be as safely carried 500 miles as they could one mile in the rough way they are too frequently brought to market.

The neatest small fruit basket is one known as Cook's patent, made to hold exact pints and quarts. Those of quart size are 3¼ inches across at bottom, and 5¼ at top, and 5 inches high. One is made of eight pieces of stuff nearly an inch and a quarter wide, and a full sixteenth of an inch thick, cut into four strips at top and over half the length, so as to allow spreading equally. They are fastened to a wooden bottom, which has a hole in its center, by tacks driven through a band of tin about one fourth inch wide, and the tops are held firmly in place by a strip of tin put on like binding over the edge of cloth, and crimped hard upon the wood, making a smooth, neat finish, and baskets cheap and durable. Of course, the work is all done by ingenious machinery, contrived especially for the purpose, and the baskets are put up in convenient-sized crates for transportation; that is, 56 quarts or 112 pints in a crate, which, being made with openings at the sides, allows a free circulation of air among and through the baskets, which is considered better than tight boxes for all kinds of berries.

The great desideratum, however, is a basket made so cheap that it could be sold with a quart of berries for a cent or less, so that it would not be necessary to return it. The same plan is now pursued with honey, which is stored in cheap boxes, which are sold with the contents.

Such baskets, we believe, can be make of shavings cut just wide enough to form one side of a basket, and laid two strips across, when the ends being turned up and fastened, would form a square box or basket of sufficient strength for the service required.

Wild blackberrries, which have become an extensive article of traffic in the New York fruit market, are generally picked in square wooden boxes, of the capacity of a quart, and these are packed in the field in crates of one to four dozen, which are carried directly to the retailer, so the berries are not disturbed until required by the consumer. All berries, however packed, should be handled no more than what is barely necessary between the picker and consumer.

Blackberries and whortleberries are frequently brought to market in bulk, and are often in a musty condition before they reach the consumer. It is a poor way to send any kind of fruit to market. Every kind of berry should be put up in just such sized packages as families usually buy, and these should go undisturbed to the very tables of the consumers. It is on this account that we hope yet to see baskets or boxes made so cheap that the retailer would not desire to empty them before sending the contents to his customers, knowing, as he generally does, that it is about an even chance that a buyer will not return the basket.

699. **Figs—Where and How they Grow.**—Figs grow in almost all countries with a semi-tropical climate. In the southern portion of all the Southern United States they flourish as well as peaches, and, with moderate winter protection, as far north as New York, figs have been ripened year after year, but they do not possess the excellence of those grown in a warmer climate. Figs are natives of Asia and Africa, where the tree grows in the form of a low spreading peach-tree, some twenty feet high. The leaves of a fig-tree are rough, deeply lobed, and not unlike those of the sycamore in size, and somewhat in appearance. The most curious thing about a fig-tree is that it exhibits to the casual observer no appearance of blossoming. The flower and fruit are united—that is, the former, such as it is, is concealed in a fleshy substance which grows at once into fruit, which, in its ripe state, just plucked from the tree, is as unlike its dried representative as a dried peach is unlike the luscious fruit we eat out of hand in the peach-orchard of choice fruit.

The fig-tree has become so completely naturalized in the south part of Europe, that the cultivation of its fruit forms an important occupation of many inhabitants. It is one of the most popular market fruits in all countries where it grows freely, and forms an article of food to a large extent, and has been the longest in cultivation of any fruit known to us. The Romans had some dozen or two varieties; the first introduction of figs into Italy being about the year 1548. It was brought to the United States in 1790, and spread rapidly, being easily propagated by cuttings taken off in spring and planted in a mellow soil naturally calcareous, or made so by the addition of lime. In the Middle States, fig-trees should be grown in the form of low shrubs, easily covered in winter, and kept carefully root-pruned to prevent too much growth of wood. It is possible that by pursuing this course, a hardy sort of figs may be acclimated gradually northward, just as sweet potatoes have been. In truth, the peach was once thought to be as much a tropical fruit as the fig is now. Of course, we can expect but one crop a year; in warm climates the tree gives two crops. In unfavorable seasons the ripening of figs is hastened by inserting a drop of sweet oil in the eye of the growing fig by using a rye straw dipped in oil, and thus carrying a drop to the eye of the fruit.

The best varieties for open culture in this country, except at the extreme South, are the Brown Turkey fig, Brown Ischia, White Ischia; the latter a very small sort, growing about one inch in diameter. Loudon says, a fig called Nevil is the richest one grown in England. One called Pregussata, appears to be the favorite for growing under glass.

We recommend all who live in latitudes where figs can be grown easily, or by a little extra care, not to neglect trying to produce enough at least for family use. One friend assures us that he can grow figs at New York as easily and surely as he can the choice kinds of raspberries. Let us all try.

SECTION XLI.—MISCELLANEOUS MATTERS ABOUT FRUIT CULTURE.

AS it is a fact that not one family in fifty has a supply of the most common of the fruits we have mentioned, not even those most easily grown, such as currants, strawberries, blackberries, raspberries, cherries, we can hardly say too much to encourage their extended cultivation, and therefore, under this head, will add several little things that may be useful to the searchers after knowledge.

Would that we could whisper a word of encouragement to every land-owner, be it a quarter section or a four-by-eight lot, till he resolved to furnish himself with an abundance of these little luxuries ere another year rolled around. Many plants are so cheaply increased by division of the roots, and so easily kept in order, they may and should be purchased by all without hindrance. Any man with the facilities for growing a full supply of small fruits, who fails to do it, should be doomed to eat sour grapes, wild strawberries, and crab-apples as long as he lives.

Though a class of fruits are termed small, there is, in reality, no excuse for their being so inferior in size that they are scarcely worth the gathering. Give them good cultivation, thoroughly working the ground with the spade and the hoe; then cover it over with half-rotted manure (chips are best), which will be a mulch as well as a source of fertility, and the result will probably astonish you.

700. **Cranberries as a Field Crop.**—We have already said that cranberries may be grown in the garden, and we now say they may and should be grown as a farm crop upon hundreds of farms that have tracts particularly well adapted to their growth. Upon this subject, Noble Hill, of Caton, Steuben County, N. Y., writes as follows:

"That the cranberry is a favorite luxury, is abundantly proved by the high price which a good, and not unfrequently an inferior, article will command in the markets. That it is easy of cultivation, and that there is an abundance of land now lying waste which is just adapted to its growth, is perhaps not so generally known. If the thousands of acres of swamps, of a peat soil, within the bounds of the single State of New York, were to be converted, as they certainly might be, into cranberry meadows, the fruit would never again be quoted at $14 or $15 per barrel in New York city. The following is submitted as the result of several years of observation and experience in the cultivation of the cranberry. The subject of my experiment is a swamp of several acres, and of a peat soil. Formerly it was covered with small brush, moss, grass, and weeds; no large timber being found on it, owing to the fact that it was submerged during a great portion of the year. On the borders of this swamp a few cranberry vines, indigenous to the soil, were to be found. By a series of open ditches leading across it and through a bank at its margin, I was enabled to remove the superabundant surface water. This done, cranberry vines began to make their appearance in different portions of the swamp, but more plentifully in the central portion, from which they began to spread over the land at a rapid rate. In their progress, however, they encountered an enemy in the shape of the brush, which not only retarded their growth and prevented the full development of their prolific qualities, but in some places entirely excluded them. Hence it occurred to me that an advantage would be gained by thoroughly subduing the soil previous to its occupancy by the cranberry. To this work I then addressed myself, accomplishing it with the plow on the borders, where the land had become sufficiently dry to render that mode practicable, and with a spade in other portions on which a team could not be driven. As done by a spade, the work consists in paring off the surface and throwing the result into heaps, which, when rotted, answer a good purpose as manure for fruit-trees. The clean surface thus exposed should be spaded to the depth of two or three inches, when the process of transplanting may be performed. If, however, the transplanting be deferred until the following spring, and the soil be occasionally stirred during summer with a hand-harrow, the plants will thrive the more rapidly. They should be set closely, as they will the sooner cover the ground to the exclusion of weeds, from which, if kept free for two or three years, they will thenceforth need but little, if any, attention. In soil thus prepared, I have transplanted the last of May, and have picked fine clusters of berries the ensuing fall. In two or three years a fine crop may be expected, and thenceforth, so far as my experience goes, will be annually realized. To insure large crops, the soil during summer should be kept well saturated with water, and if flowed in the spring, all the better. This I accomplish, as far as possible, by a proper adjustment of my drains, opening and closing them according to the variations of the weather from wet to dry. As to transplanting, there is no difficulty whatever. If an equal number of cabbage and of cranberry plants be set, more failures would be found among the former than among the latter. A cranberry plant a yard long, set in a mellow peat soil in a wet season, will take root at every point of full contact with the soil."

It is a pity that we can not convince all the owners of such swamps as Mr. Hill describes that they can grow just as good berries as he does. There are many such places within a few miles of this city that are now pests to the owners, that would be profitable ever after if once set in cranberry vines.

The cranberry has been very much improved—as much so as any other fruit. I do not know of any fruit that offers greater inducements to experiment with than the cranberry in seedlings, since it has already shown such good results. If cranberry seed, or any other hard seed, is difficult to vegetate, it may be scalded with boiling water.

There is no doubt that cranberries can be grown upon any soil that has water a few inches below the surface. Upon tolerably dry upland cranberries have been grown to advantage, and they will grow in very bare sand if either naturally or artificially watered.

Considering the high price which cranberries always bring in market, and the cheap cost at which they can be produced, it is strange that more shrewd farmers have not gone into the speculation. A good deal of attention has been given to the cultivation of cranberries in Burlington County, New Jersey, about 150 acres having been planted in one season. Of this, one farmer named Chetwood has set out 25 acres; another, named G. Gowdy, 17 acres; and Mr. Allen, 10 acres.

Upon Cape Cod, where cranberry culture has been carried to the greatest extent, swampy land that was a few years ago considered utterly worthless, has now a salable value of $800 to $1,200 an acre; and some of the owners of such land have found it a good investment of time and money to expend from $200 to $1,000 upon an acre to bring it into a condition fit to be planted with cranberries.

All over this country there are numerous bogs which might easily be converted into fruitful cranberry gardens.

In view of these facts we make this pertinent inquiry of every farmer in all the Northern States, where cranberries are found growing wild: "Are there no swamps, or wet valleys, or brook borders upon your farm, now, perhaps, unsightly spots—wet swamps in winter, and dry and pestiferous in summer? If you have such, plant them with cranberry-vines, and tend them one or two years till the vines get well set, and then they will tend themselves, and produce you on an average more bushels of fruit per acre than you get of potatoes; and it is not much more work to gather it than it is the tubers, and, generally speaking, you can sell a bushel of cranberries for the price of five bushels of potatoes."

Truth, it is said, lies at the bottom of a well. The well that holds the truth in relation to cranberry culture and its profitableness upon many of the worthless bogs that render farms unsalable, and detract from the value of the upland, must be a remarkably deep one, or it would have been dug out before now, and made to shine in all the rich crimson luster of a field of this ripe fruit.

701. **Varieties of Cranberries and How to Grow Them.**—The American cranberry (*Oxycoccus macrocarpus*) is divided by growers and dealers into three varieties—the Bell, the Bugle, and the Cherry. It will grow on almost any soil where the water is not more than a foot from the surface, yet experience has proved that the soil best adapted to them is nothing more nor less than the plain beach sand, entirely free from any matter, either animal or vegetable; in fact, this berry may be said to live entirely on air and water.

Peat is found to be well adapted to this berry, but requires some care in preparing, owing to its liability to bake and crack in hot weather; this may be obviated, however, by taking off the turf and grass, leaving the surface exposed to the action of the weather for a year, after which it becomes light and porous, and fit for the reception of the vines.

Cutting-planting has been adopted by some as the most economical plan, and as the plant sends out long runners, sometimes to the length of five or six feet, it is self-evident that the first cost of cuttings must be small. The cutting should be about six or eight inches long, and should be planted by thrusting the middle into the earth with a dibble, permitting a few inches of each end to project, so that when it takes root you have two plants instead of one.

Another plan of propagating by cuttings is to cut the vines into pieces of about two inches in length, for which purpose a common hay-cutter may be used, and sowing them broadcast on ground prepared for them, and then harrowing them in as you would wheat or rye. It is preferable to plant them in drills at such distances as will permit cultivation with the plow for the first two years. These small cuttings will soon take root from the point where branches join the stem, and will send out runners the second year after planting.

Planting separate vines has been found to be the most effectual plan, and although it consumes more time, and is perhaps attended with rather more expense, yet from the absence of weeds and the fine chance for the vines to spread, the cultivator finds himself amply repaid for the increased outlay.

The distances of planting must be regulated by the nature of the soil; if liable to weeds, you must give yourself room to work among the vines; but if you are planting on plain beach sand, the closer your plants are the better, for the great object in forming a cranberry-yard is to have the entire surface covered by a thick mat of vines as soon as possible.

The time of planting generally preferred is in the spring, as in this case the roots are not so liable to be thrown out by the winter frosts—say from the 15th of April to the 1st of June.

As a general rule among farmers, they will be able to select some spot of meadow land which is low and moist, free from stagnant water, and somewhat sheltered from storms, as this may be considered the best location.

A position where the yard can be flooded in winter is very desirable, as the vines, when exposed to very severe weather, are liable to be winter-killed down as low as the roots, which throws them back in bearing for a year; besides which, it is sometimes desirable to flood them during the fruiting season to prevent the attack of the worm, which in some localities is quite destructive.

An acre of vines, properly cultivated and well matted, will produce at least two hundred and fifty bushels of berries; in some instances a yield of four hundred bushels per acre has been obtained, but this is above the average, and may not be relied upon.

Two hundred and fifty bushels of berries, at the low price of three dollars per bushel, gives us seven hundred and fifty dollars as the product of one acre. Vines for a new plantation should be procured from meadows which have borne well, and of good fruit, as the best way of knowing good bearers.

If the yard can be flowed, though not absolutely necessary, the water may remain on all winter, and be let off in March. It should be let on about the 20th to the 25th of May, and again the 1st of June, not exceeding thirty-six hours. After this it is not needful. Blossoms are injured by the water remaining on too long; the object of flooding is to destroy the insects. After this second flowing, there is little to fear from them.

A Cape Cod cranberry grower gives some useful advice to persons disposed to embark in cranberry culture. He says:

"Suppose that those who are favored with some of the natural facilities desire to do something with cranberries, it would be folly to expend much money in clearing up a swamp. The best thing to be done is to study the nature of the soil in which the vine is flourishing, and then to prepare a small patch—say two or three rods—and plant the vines there, and bestowing some trifling degree of care upon them, by way of weeding occasionally, you will see by this experiment whether it will do for you to proceed much farther in their cultivation. If you fail, that failure will most likely suggest to you the remedy. Great mistakes are made in anticipating from planting waste lands with cranberry vines, that they are about to realize two hundred per cent. It will do very well for an experienced man to make large yards, and with certainty of success, but it will not do for a man who knows nothing about the cranberry and its culture to go rashly to work. You will prevent future expense and galling disappointment by making your first trial on rather a small scale.

"The cranberry vine can be naturalized to those regions of country in which it is not indigenous. The Bugle cranberry is generally found to throw its runners from the swamp toward the upland. The runner receives its moisture from the roots of the vine which rest in the damp soil. Now, if you will take these runners and plant them where there is some moisture, in an upland soil, and stir it frequently during the hot months of summer, they will live through the apparent drouth. Two years hence take the young vines and carefully plant them, and you will find that you have done much toward naturalizing the vine even to a situation where there can not be any overflowing. Many persons have planted on the upland with vines from the swamp, and the transition from abundant moisture to a comparatively dry situation has been too sudden, and the vines have consequently died. Those who try the upland should get the vines which have been naturalized to a dry soil, or it will require immense trouble and some years to do anything to advantage. It will be well for those who intend to try the cranberry vine on a comparatively high and dry situation, to remember that the fruit produced is not so large, nor yet are the quantities equal to those which are yielded in more favorable locations, where there is either peat, beach-sand, or fine gravelly loam, and the ability to flow in winter. I believe that the time will come when the commercial value of the cranberry will be better understood, and when farmers in all parts of the country will feel it to be their interest to cultivate a patch of this fruit, and when its requirements will be better under tood than at present, and when it will be a source of profit to those who think it worth their while to raise the berry.

"A short time since I saw a swamp which was formerly so covered over with brakes, huckleberry-bushes, and briers, that it was of no use to the owner until he paid some attention to the subject of cranberry cultivation, and cleared the swamp, which he found to have a peaty bottom. The ground was then planted over with vines, and the property, including clearing, vines, and planting, cost him $300, but I was informed by the proprietor that he had muck from the swamp which he valued at $150. The first year he had off this one acre and a half one or two bushels; the second, twelve bushels; and the next year, seventy-three bushels, which were sold at $4 per bushel. If the yard cost him $300, he nearly realized in the third year subsequently to its being made, the sum of money he first expended upon it."

Our final advice, to all who desire to plant cranberries to any extent, is to hire some experienced person to do the work, and give instructions for the future care of the yard, according to the circumstances of its location.

High bush, or tree-cranberry, is the common name of a berry sometimes sold under the recommendation of being equal to the fruit we have been describing. It belongs to a very different order of plants from the cranberry—the real *oxycoccus*.

The only use of it is as an ornamental shrub. No housewife will try to use it but once in the place of the true cranberry. The fruit is almost wholly a hard, long seed, scarcely covered with pulp, and when cooked with much sugar, though resembling the true cranberry, sadly mocks the taste.

702. **How to Cook Cranberries** is an important question. They are sour, acrid, unpalatable, and unwholesome in a raw state, and but little better as they are usually cooked. We have often seen them hastily scalded, sweetened, and brought to the table floating in their juice, not one half of them cooked enough to burst the skin. Bah! what food! But how different when cooked! Put them, with only water enough to prevent burning, in a tinned sauce-pan, and stew until by stirring the whole becomes a homogeneous mass, with no semblance of whole berries, and then add clarified sirup, previously prepared, and stir a few minutes while boiling. When cold, you have delicious cranberry jelly.

703. **Fruit-Tree Protectors,** of an ingenious character, to guard against worms that crawl up the bole of a tree, invented by Wm. W. Taylor, of South Dartmouth, Mass, have been considerably used in New England, and found highly efficacious and satisfactory, being so constructed as to be an impassable bar to everything that seeks to go up or down the body of the tree. This protector consists of a circular kind of dish that shuts on to the body of the tree, and is kept filled with some liquid, usually a preparation

of bitter or salt water, entirely offensive and destructive to insect life. The top part of the dish constitutes a projecting roof, to prevent flying up from the lower ledge, also to exclude rain-water.

They are usually made of cast iron and of different sizes, to adapt them to different-sized trees. There is a soft packing used to fill a considerable space between the collar of the dish and the body of the tree, so as not to interrupt growth or free circulation.

704. **Watering Newly Transplanted Trees** often does as much injury, or more, than it does good, by forming a hard crust over the ground immediately over the roots.

If water is applied at all, the earth should be first removed from the roots, and a copious supply poured on. But this, too, is of little use. The roots are drenched for the moment, and in a short time are as dry as ever. The only remedy is a thick, heavy mulching. If of old straw, it should be about six inches thick, covering several feet in diameter. A young tree will scarcely ever die if treated with such a covering, though transplanted in midsummer, when without the mulch, death would surely ensue.

705. **Thumb Pruning,** that is, pinching off buds, which if let alone would grow into useless shoots, is much better than waiting until they are grown, when the knife or saw must be used. In large trees, shoots often grow out from the upper side of large branches, and in process of time make a thick bushy top, where good fruit can not grow nor be easily gathered. Rub them off when forming, or leave only such as will improve the tree.

The same thing should be practiced upon blackberries and raspberries, whose new shoots, when about four feet high, should be pinched in, that is, have the tips nipped off with thumb and finger. This will start out side-shoots, which should also be pinched in when a foot or so in length. This treatment makes stout, compact bushes, that will bear abundantly next season; whereas, if left neglected, the stems will extend in every direction, prevent proper cultivation, and scratch and tear every person who comes within a yard of them, besides giving a poor crop, and leading the owner to conclude they are a humbug. As soon as they have done bearing they should have the old bearing canes cut out, and all the new shoots, except half a dozen of the best, which will then grow unimpeded, and make fine bearers another year. The common practice of allowing a mass of canes to grow up thickly together, to be thinned out only the following spring, is a waste of growth, and weaker canes and smaller crops are the result.

706. **Stirring the Soil** about newly planted trees or plants of any kind during drouth is one of the best things that can be done, so that care is used not to disturb the roots, for it increases moisture. Heat, light, and electricity are all accelerated in their action as chemical agents by moisture. Therefore let it be known that a vast bed of soil well stirred and mellowed is a prodigious laboratory, producing, chemically, all the elements necessary for vegetable nutrition. It is owing to this, and not manure, that the peach-orchards of New Jersey and Delaware have furnished such immense crops;

they are frequently plowed, but not planted to other crops. The plowing is to cultivate the trees.

707. **Tobacco for Worms** that infest peach-trees is highly recommended. A person who thinks he saved his trees by applying tobacco, says: "I found the gum oozing out plentifully, and just under the earth's surface, in and about the roots, numbers of small white worms. I took a mason's trowel and a sharp knife, and scraped all I could away; also the ground from the roots, and then purchased a keg of common smoking tobacco, cut fine, covered the trunk just above the roots with it, and drew the earth around the tree again. This summer the trees have revived and are now in a healthy condition."

708. **Sugar-Drying Peaches** is one of the methods of preserving this fruit that should be known to all who have orchards too far from market towns to enable them to sell their fruit direct from the trees. Peaches prepared in this way are richer than by any other process, and to our taste far superior to figs or raisins to eat out of hand, as they will almost melt in the mouth, giving the true peach flavor. To prepare this fruit, pare rich, ripe peaches, and take out the pits, and lay the halves on the back upon plates, filling the hollow with fine white sugar. This dissolves and forms with the peach-juice a most excellent sirup. The best plan would be to place the peaches on perforated covers of shallow dishes, so that the juice would drain down, leaving the fruit to dry slowly in the sun or a slow oven. A steam-pipe heated room would be better. The quantity of sugar required is about one sixth of the weight of the fruit. The process is very simple and easy, and the product both in sirup and fruit very good. See 485.

The sirup is bottled and used for sauce on puddings, cakes, etc., and for flavoring mince-pies. Excellent as this preparation of fruit is, vast quantities of peaches go to waste every year, even where they are gathered for market, for some become too ripe for transportation, and such are just right for sugar-drying, and would undoubtedly sell higher than figs or raisins.

709. **The Best Apples for Keeping** are those grown upon mature trees, planted upon dry soil The most important thing about preserving apples for shipping is to pile them under straw on a barn floor and sweat them dry; then put a layer of sand at the bottom of the barrel; then layers of apples and sand, and head up air-tight. The latter is very important. Apples may be kept through freezing weather in an upper room headed up in this way, and so they may in linen bags.

710. **Cider-Making without Pressing.**—It is stated that a man at Parkersburg, Va., is successful in making cider by the following process: He grinds the apples, and fills casks with one end open, the bottom having some sticks and straw, like a leach-tub for ashes. On the pomace he pours as much water as it would yield juice by pressure, and that displaces the juice and sends it to the bottom, from which, after two days, it is drawn by opening the faucet, and as the cider is heavier than water, it runs off at first pure. The pomace, too, having an affinity for water, absorbs that, which

displaces the natural juice and leaves the pomace quite tasteless. This process may be useful to persons who have a few apples and no cider-press.

711. **The Orchard House** is the name given to a glass-roofed structure now common in England, and to a small extent used in this country, to grow all kinds of fruit, though not by artificial heat. At Newport, R. I., Wm. B. Lawrence has what we see termed an orchard-house, 300 feet long, which is heated by hot-water pipes, while real orchard-houses are intended to keep an even temperature all the year round; but since this can not be done except by fire heat, owing to our severe climate, the objections are many against this mode of growing fruit. Such structures are nearly as cool at night as the temperature outside, while the sun heat by day, without constant airing, is equivalent to an English vinery. Hence the trees, being unprotected, are chilled by frost and excited by heat, either of which, alone, would be injurious to the crop, and, in combination, destructive, so that orchard-houses, wherever necessarily conducted as mere hot-houses, are too expensive for growing any but high-priced fruits.

712. **Apple-Paring Machines** are a necessity in every family that owns an orchard, and an equal necessity is to know which of the many that have been patented, and offered with wonderful recommendations, it is worth while for a farmer to buy and try to use. After spending a goodly sum of money, and a good deal of time and patience upon a variety of apple-parers, we wrote our experience for the benefit of others, wherein we said of one: "As a funny rattle-trap to amuse children, and sell for a good profit, it was a very ingenious Yankee invention, but as an 'apple-parer and slicer' it was a—humbug."

Having thus vented our opinion of apple-parers, we were favored with one more of the same family, called by the inventor the "Turn-table Apple-parer," and after three years' use, we are willing to say of it, that it will pare apples expeditiously, and it can be operated without the aid of an engineer. It makes no pretensions to do anything but pare the apple. You put it on with one hand, turning the crank all the time with the other, and no matter what size or shape the apple is, the knife will follow the surface and take off the skin. When the skin is off, the same motion of the crank continued, carries the knife away from the apple and back to the place of starting, where it is to begin upon another. The pared one is taken off and another put upon the fork while the knife is passing round. The whole machine is made of iron, and can be packed in a box eight inches wide and four inches deep. When used, it may be attached to any table or bench by a thumb-screw. This perfect little machine, which every family that pares a peck of apples a year should have, is made so cheaply by Yankee ingenuity and machinery, that it is sold at retail for a dollar, and it is, in our opinion, the best of the whole family of apple-parers.

CHAPTER VII.

THE VINEYARD.

SECTION XLII.—HOW TO PLANT AND CULTIVATE VINES—WHAT SORTS TO PLANT.

IF any of our readers expect to find in this section the whole art of planting and cultivating a vineyard, and manufacturing its fruit into wine, they will be disappointed. The intention of the author is to produce just enough information to whet the appetite for more, and induce research into other sources of instruction, from some of which we shall draw facts that will be interesting and useful for every one to learn.

713. **History of Varieties of Grapes.**—The origin of varieties is a matter of interest. The most common and best known sort is supposed to be a native of South Carolina, brought to Brooklyn, N. Y., and distributed from there under the name of *Isabella*, in respect to Mrs. Isabella Gibbs, wife of Capt. Gibbs, who brought the vine home from one of his Southern voyages. It is very remarkable that this grape is not found now in the State where it is supposed to have originated, except where it can be traced back to the Gibbs vine.

The *Catawba* is also a Southern grape, having originated, according to the best evidence we have seen, in North Carolina. It is a little singular that both the Catawba and Isabella are now well acclimated north of latitude 42 degrees, and are much more grown in Northern than Southern States. The Herbemont also does well at the North.

We give some slight descriptions of several of the most common sorts of grapes, taken mostly from Dr. Grant's catalogue, which is a pretty good treatise upon grape culture. Dr. Grant is the greatest propagator of vines, under glass, in the world, having about an acre covered, on an island called Iona, in the Hudson, near Peekskill, forty-five miles above New York.

The *Offen Grape* is the name of a seedling originated at Painesville, Ohio, a sample of which, sent us by Mrs. Nancy T. Offen, convinces us that she had better devote her attention to cultivating one of the dozen other sorts, which are far superior to this in all that constitutes a good grape for the table, and for raisins or wine.

Nicholas Longworth says: "I obtained from Vermont a grape, hardy in that region, called the Lyman, and some others, that I believe will be valuable for wine. And the Clinton grape, from the northern part of New York, from Mr. James H. Watts, of Rochester, I have made wine from.

"The *Fox* grape is readily distinguished. It has a fine aroma and flavor, and may be smelled at a distance, but is deficient in sugar and not abundant in juice; skin thick, pulp hard, leaf thick and white on the under side, vine more or less covered with hairs."

Union Village, a standard garden variety, is worthy of general cultivation.

Lenoir, ripens early, has a great degree of hardiness of wood, and winters perfectly in very exposed situations farther north than the Isabella. It will still be prudent to stop the shoots in August or September of young vines, and lay them down for winter.

Allen's Hybrid.—This shows itself vigorous and hardy, and probably will not disappoint the high expectation entertained of its value as a leading garden variety, and our best white table grape.

Taylor, or Bullitt.—This is a beautiful white grape, of excellent flavor, by Judge Taylor, of Jericho, Ky. It is described as remarkable for hardiness and productiveness, and is worthy of trial wherever the Isabella will thrive.

Pauline comes highly recommended from the South, but from actual trial, little known at the North. It is very distinct in its flavor, and adds to our variety.

At the South, especially in Carolina and Georgia, some very excellent varieties are grown, of which the Herbemont is a type. It was first introduced, about the year 1825, by Mr. N. Herbemont, a zealous pioneer in wine-making, at Columbia, S. C., where the original Herbemont's Madeira is still growing.

The *Delaware* is a small grape of surpassing beauty and most excellent flavor. It attracted the attention of Mr. A. Thomson, of Delaware, Ohio, and was exhibited by him at the county fairs, under the name of Heath Grape. A few years later, after becoming fully assured of its great value, he introduced it to the public under the name of Delaware. Its great excellence proved a hindrance to its dissemination, for it was claimed that no such grape could be of American origin.

The history of the Delaware grape is, that it originated in the garden of Mr. Prevost, in Frenchtown, N. J., and is supposed to be a seedling from the Catawba, fertilized, perhaps, with some foreign variety. Wherever known it is esteemed above all other varieties for its wonderful hardiness as well as excellence of fruit. Mr. Longworth, who at first thought the Delaware and Traminer identical, has now given up all ideas of that kind, and his head-gardener stated, a short time since, that he considered the Delaware the best grape in this country for general cultivation.

Persons who have ordered vines have undoubtedly been much imposed upon by this Red Traminer grape, sent to them as the genuine Delaware. A Rochester grape-grower says the Delaware is the best of all American grapes, and is the best that we have ever seen for out-door culture in this latitude, because it possesses great hardiness, productiveness, and earliness.

It has been known to stand uninjured where Isabella, Clinton, and Catawba have been killed to the ground. It is a great bearer. The berries and bunches increase in size as the well-cultivated vine grows older, and it probably will produce more pounds of fruit to the acre than any other sort in cultivation, and it ripened at Delaware, Ohio, about the middle of August, and in western New York will ripen early in September, and there is no other native grape, nearly as good, that ripens so early.

Delaware vines are very hardy, and adapted to all situations, ripening both wood and fruit in the uplands of Ohio or on the sea-board. It grows finely at Hartford, Conn., and New York, Albany, and Newburg, N. Y., in various soils and situations. It is more hardy than the Catawba or Isabella at Iona, where it has been more largely propagated than anywhere else; and Dr. Grant is entitled to the gratitude of the lovers of good fruit for having done more than any other man to bring this valuable new grape into notice; for the world will appreciate it as soon as it comes to know the value of it, both as a table grape and for wine, for which it is the best of any grown in the Atlantic States.

The *Marion* grape deserves attention as a very early variety.

The *To Kalon* grape resembles the Black Hamburg. Dr. Grant speaks of it as desirable for a private garden, and says the fruit is exceedingly sweet and luscious, has very delicate aroma, and when well ripened is without toughness or acidity in its flesh. It ripens a week earlier than the Isabella.

The *Concord* is a very vigorous and healthy grower, and bears abundantly, although not much disposed to over-bear. It ripens ten days before the Isabella, and its leaves are much less likely to mildew than that variety. In flavor it is very sweet, and will undoubtedly become a valuable market fruit in the latitude of New York and farther south.

The *Rebecca*, originated by Mrs. E. M. Peake, and introduced by Mr. Brocksbank, of Hudson, N. Y., added another to the list of valuable and beautiful grapes.

The *Diana* takes its name from Mrs. Diana Crehore. It is a grape of surpassing excellence and beauty.

The *Anna* is an early and profuse bearer, and the produce of young vines is of very high flavor, but not without a considerable degree of toughness, which disappears as the vines acquire age and maturity.

It ripens quite as early as the Diana, and fully two weeks before the Catawba, hangs very late on the vines, and is not injured by severe freezing. For late keeping it is unequaled, and its raisins are not surpassed in quality by any foreign variety.

The *Hartford Prolific* is hardy, vigorous, and productive. Bunch large, shouldered, and rather compact. Berry large, globular. Skin thick, black, and covered with a thick bloom. Flesh sweet, moderately juicy, with considerable toughness and acidity in its pulp, with a good deal of native perfume. Ripe ten days before the Isabella—at New York, September 5th.

Our objection to it was its disposition to drop its fruit as fast as it ripens, just like the Fox grape in the woods, covering the ground with scattered berries. Cultivation has nearly cured this fault.

The *York Madeira* is early, hardy, and when fully ripe very sweet and somewhat vinous. There are two or three sub-varieties of larger size, but of greatly inferior quality to that which has been somewhat extensively disseminated under that name, and of which *Canby's August* appears to be a synonym.

The *Elsingburg* is vigorous, hardy, and productive; ripening early—about one week before the Isabella—and is in quality best, but its berries are small, and its bunches not compact, though generally large. It has no toughness or acidity in its pulp, and to give a large, rich mouthful of its enjoyment, several berries may be taken at once. It is worthy of a place in every garden.

The *Louisa*, a seedling raised by Samuel Miller, of Lebanon, Pa., must be considered an acquisition by those who adopt the Isabella as a standard of excellence. It is ten days earlier in ripening, and to most tastes a better fruit, and appears to be more hardy.

The *Logan* is a black grape of medium size, and bears a strong resemblance, in general character and appearance, to the Marion, which also was found in the same region.

714. **Dr. Grant upon the Cultivation of Grapevines.**—The following directions were given by Dr. C. W. Grant in an address upon the subject of grape culture. In relation to pruning, he said:

"Cut off the first year's growth above two buds, and next year cut back so as to leave two buds of that year's growth. In nature a vine grows both branch and roots to a great length before bearing fruit, as it can bear no fruit until its leaves and branches reach the air and sun at the top of the tree. In cultivation we must train vines to new habits. We can not depend upon any but native varieties. A well-grown vine will reach five or six feet the first year, and ten or twelve feet the second year, and its success as a bearer will mainly depend upon the manner of training and trimming it the first years. No untrimmed vine can remain healthy or be productive. Fruit-buds grow upon the same branches but once. Ten feet square of ground is required for a root, and six or seven times that for the vine. Mildew is the great enemy to contend with, and the vine must have air and vigorous growth, for that tends to prevent mildew, and it must have room so as to expose every leaf to the sun. On the third year two bunches to a cane or branch are all that can be grown to perfection; all others must be plucked off. The leaves naturally develop themselves to the sun, and no more leaves must be left than will fill the space. No healthy leaf grows in the shade. Vines suffered to bear too full the third year are ruined ever after.

"The fourth year train up four upright canes, and these will each produce three bunches, and the horizontal shoots will produce twenty-four bunches and bud out new shoots. Only three bunches to a shoot should be grown, and a bunch never should be exposed to the noonday sun. Training vines upon the trellis is best for the vineyard. The arbor gives shade, and may give satisfaction, but the trellis gives the most fruit. Four feet length of elevation of canes is as much as will produce perfect fruit.

"At the end of the seventh year the vine is fully established, with three branches on each shoot, which will give six bunches, three on each arm between each upright. At the base of each shoot is a bud for the fruit-bearing shoot next year. The ends of the fruit-bearing branches must be stopped at about two feet from the base. It will shoot again and must be stopped again, leaving one leaf. The best thing to tie vines to the trellis wires is basket willow. Bulrushes are also good. Hatters' trimmings are also recommended.

"If all the fruit-buds are permitted to grow, the vine will soon be ruined. The best bunches always grow nearest the stalk. November is the best time to shorten back a vine to the buds that are to be left for bearing. It is an object with the young vine to cut back or stop the growth of branches to give strength to the root. Pinching the bud of a growing vine is to give vigor to the root as well as the buds that are to furnish the canes for fruit next year."

The Doctor exhibited vines one year old six feet long, and two years old twelve feet long, grown from two-eyed cuttings of the Diana grape, which is considered a slow grower. He said:

"Long cuttings should never be planted. Two or three eyes are better—two eyes are best. A serpentine form given to a young vine makes it grow stronger. The best plan to get new vines is by layers. It makes vines that will bear earlier. I have seen five bunches upon a Delaware cane of one year grow perfect; but three bunches to a cane generally is as much as can be depended upon. A vine must not be made to over-bear or over-produce wood. Sparing the knife spoils the vine. I think in this country that the trellis form of growing vines, both for wine and market fruit, will be the best plan—better than growing upon stakes. On posts seven or eight feet high place five wires, and set the rows ten feet apart, and running north and south if convenient. Grapes can be grown to advantage in the city. A vigorous vine can be carried up six or eight feet a year without bearing until it reaches the top of the house, and there trained upon a trellis, and produce good fruit many years. Vines can also be trained upon brick walls or in yards that have four hours of sun a day. It is not necessary that the sun shine constantly on the ground where a vine is rooted, so that it reaches up to a sunny spot for leaves and fruit. I have trained vines up a house-side three stories high.

"All sides of a house may be used, but on the north side the fruit will not ripen well. A northeast exposure on the sea-coast is not a good one for grapes. One objection to an eastern exposure is bright suns after frosts. Summer pruning is indispensable. In the angle between the leaves two buds start, and if one is not pinched out it will produce a shoot that will bear green grapes in the fall. Care must be taken not to cut off the vines in the hard wood in the summer. The shoot must be stopped in the bud by pinching, and not by cutting away hard wood. Vines never should be trimmed with ordinary shears, but with a very keen knife, with a smooth cut.

"The bunch next to the main stem covers the bud of the fruit bearing branch for next year. In autumn pruning, all of the fruit-bearing arm is cut away to one bud. November pruning is better than March, on account of the sap exuding. There are many advantages in pruning in November, but if neglected then, it must not be neglected altogether, for upon that, and also plucking off all excess of fruit, depends the success of grape-growing.

"Carrots are an excellent crop to grow upon ground prepared for grapes; they will pay all the expense of preparation.

"Any good corn land, deeply prepared, will grow grapes, but for a successful vineyard the land should be trenched three feet deep and made rich, and there is nothing better than swamp muck for this purpose. It should be composted with animal manure, and well rotted, and thoroughly mixed with the soil.

Dr. Grant stated that he had imported "every variety of grape, and had found none that could withstand our winters, while the Delaware grows in every kind of exposure, and never suffers. As for the story about the Delaware growing wild in Pennsylvania, I have investigated that matter thoroughly, and defy any one to produce an iota of evidence to sustain the story.

"In planting a vine, recollect the above few simple rules, and you will have no difficulty in growing them to your satisfaction.

"Although the wants of the vine are few, simple, and easily supplied, yet they are imperative, and, as with all the other fruits of our climate, it is only to judicious care that it can yield its richest delight."

715. **Grafting Grapes.**—"Grapes can be and are sometimes grafted when it is desired to test a variety in as short time as possible. We understand that Mr. Longworth sometimes obtains fruit the same year the grafting is performed. This is owing to the fact that the grape bears fruit on the current year's growth, and not on wood of one, two, or three years old, like the peach, apple, and others. It is not, however, a profitable method of increasing the grape, being rather a slow job and uncertain in growing. Besides, the same labor in raising stocks on which to graft might grow a better kind of vines from cuttings or roots."

The late Dr. Togno, who spent much of his life in this country in promoting the culture of the vine, told us, when establishing his vineyard at Wilmington, N. C., that he expected to derive considerable advantage in grafting cuttings of choice grapes into the wild vines that grew abundantly upon the land, and that only under similar circumstances would grafting be of any use. His process of grafting was very simple. In some cases we noticed that gimlet-holes were bored, with a small inclination downward, into large vines, and the graft sharpened and inserted so as to bring the base of a bud in contact with the fresh cut in the old stock; and in others the grafts were inserted in a cleft, either in the side of a vine or the sawed-off end.

716. **Caution about Buying Grape Cuttings.**—Do not buy cuttings of Delaware vines, and others of similar growth, as they can not be depended upon to make roots under ordinary cultivation. They are not cheap at any price to ordinary farmers, who usually will be obliged to plant them in open ground, where they will have but little attention.

It needs hot-house propagation and very skillful management to grow good Delaware grapevines from buds. It has obtained such a wide notoriety for its excellence that great care should be exercised, so as to be sure not to get a Red Traminer, or something equally worthless. Buy rooted vines of responsible men, and though slow of growth the first years, do not be discouraged; keep your vines well cared for, and you or yours will enjoy the fruit.

717. **Profits of Grape-Growing.**—Mr. Andrew Reisinger, a German vinedresser of forty years' experience, settled some years ago in the town of Pultney, Steuben County, N. Y., and in 1854 procured from Ohio six thousand cuttings of the Catawba grape, which he planted, four feet apart, on land well trenched and subsoiled, and in 1857, from an area of less than an acre, pressed three hundred gallons of juice. Next spring he increased his area of grape culture by an acre and a half, and from an acre of older vines, one eighth only two years planted, pressed six hundred gallons of juice, besides keeping four hundred pounds of grapes to show to buyers of cuttings the quality of the fruit. He thinks the grape culture can be made decidedly profitable, even on the highest suitable lands in New York; that is, on sandy or gravelly loam having a southern to southeastern exposure. Of course the cultivation must be very thorough.

A Mr. Provost, of Williamsburg, L. I., manures his vines highly, and covers the manure with sand. He exhibited a bunch of an Isabella vine ten feet long with seventy bunches of grapes. Such a vine must be much more profitable than the one mentioned in the next paragraph.

718. **Gigantic Grapevine.**—The *Horticulturist* for October, 1858, gives an engraved representation and account of a grapevine at West Hill, near Burlington, N. J., that measures six feet and one inch around the trunk three feet above the ground, and three feet around at ten feet high. In extent, it is equally enormous, spreading over four large forest trees, one of which is a full-sized black oak, the largest tree being ten feet in circumference two feet above the ground. This monstrous vine is a male, of the wild grapes of the country, and although regarded as a wonder, it had never been known

to bear fruit. The diameter of the circle of the ground covered by the branches of this vine is over one hundred feet. Vines are recorded of the known age of six hundred years. Statues have been carved from grape-wood, and pillars made from it; even the large doors of the cathedral of Ravenna are made of the grape-tree. In some parts of Italy, says Miller, "A vine is considered young at one hundred years, and there are plants in existence which have been cultivated three hundred years."

719. **How to Grow a Vine in a City Lot.**—"It so happens sometimes that we have an inside walk running near the house—so near that we have not room enough to make a border between it and the house on which we wish to train our vine. In that case we should take up the walk and enrich the ground under it, so the roots can penetrate it, which they will readily do; or we may plant the vine on the outside, and when we have produced a good strong cane—say eight or ten feet long—we can take up a narrow strip of the walk, make the soil rich, and then lay the vine down, covering it three or four inches with soil, put down the walk again, and bring the vine out on the opposite side. Vines treated in this way will grow as strong and as well as when planted in the open border.

"The most simple and easiest managed system of training the vine is with horizontal arms. To grow a vine on this plan, we commence by growing one cane on an upright stake, pinching off the little side branches or laterals, leaving one leaf; this pinching is to be repeated when the laterals grow again, and an additional leaf is left at each successive pinching.

"If the vine is planted in a lot so shaded that the grapes will not ripen near the ground, the vine may be trained up the wall, quite to the top of the house, and the fruit-bearing arms formed on a trellis on the roof. By skillful training a vine can be grown, and grapes produced in abundance, upon any city lot, no matter what the exposure."

720. **Training Vines Upon Walls.**—This is more practiced in Europe than here. There walls are built on purpose and pay a profit, and doubtless might be made to do so near cities in this country. The plan is much practiced in France. A very thick high wall is found to be so heated in the daytime that it retains the heat during night, and this makes the grapes much sweeter, and saves them from danger of cold weather.

721. **Ringing Grapevines.**—This is a process adopted to increase the production of a vine and enlarge the fruit. It is to remove a ring of bark about one fourth of an inch, or perhaps half an inch wide, from the bearing branch, near the junction with the main stem, about the time of the setting of the fruit in spring. The effect is an increased vigor of growth upon the branch so treated, and larger, handsomer—not better—fruit, which in some instances has ripened ten to fifteen days earlier than the fruit upon branches not rung. But mark, these rung branches will have to be cut away another season, as the wound is not likely to heal over so as to make a healthy branch next year. So, you see, care must be taken not to ring any branch of a vine that you wish to preserve for training, and it would be advisable

to ring only a portion of the branches you intend to cut away at the next pruning.

722. **Grapes Under Glass.**—Mr. Charles Butler has demonstrated to the suburban residents of New York city what can be done in raising grapes under glass. His place is near White Plains, Westchester County, N. Y.

Mr. Butler has erected vineries a thousand feet in length, with a fine exposure, and has introduced the rarest and finest grapes, and in less than three years from the time of setting out the vines, he has taken off about two thousand pounds of grapes, of extraordinary size and flavor—the Black Hamburg; the Muscat of Alexandria; the Zinfendel, a native of southern Italy; the Tokay, the Syrian grape, growing in immense clusters, sometimes attaining, in its native clime, the weight of ten or fifteen pounds. These are the grapes of Eschol, such as the spies brought on a pole between them as samples of what the land of Canaan would yield.

Beside these, he has the Cannon Hall, Chasselas of Fontainebleau, West St. Peters, Lombardy, White Frontignac, Purple Damask, and White Nice. But the most magnificent of all is the Barbarossa, which has rarely been fruited in this country.

723. **Economical Grape Trellis.**—At Westchester, Pa., Mr. Jeffries has a cheap grape trellis. A cedar-tree, possessing a symmetrical form of branches, is selected, and when cut down the branches are carefully preserved, thinning out the smaller twigs, but leaving the pyramidal shape prominent. This is used as a stake, and when covered with vines is highly ornamental, as well as forming a superior support for the grape. A row of them, seen from a distance, has the appearance of luxuriant forest trees.

The French, near Fontainebleau, have a cheap way of making very good and durable trellises. They set posts of locust, about three or four inches in diameter, two feet in the ground and six out, and about eight or ten feet apart. They then tie across the posts strips of white oak or ash, about one inch thick and ten or twelve feet long. These strips are split out in the same way that we split out hoops for flour barrels, and tied to the posts with annealed iron wire.

724. **Delaware and Red Traminer Vines Described.**—Andrew S. Fuller gives the following directions for distinguishing the Delaware from the Red Traminer. He says:

"There has been much talk about the Delaware grape being the Red Traminer, but it was only by those who did not know either. How any person, even a casual observer, could confound the two, is more than we can understand, for the difference between them is so apparent that a man, by the sense of feeling, could easily tell one from the other. The buds of the Traminer, like all the foreign varieties, are very prominent—much larger than the Delaware, although the latter has buds quite large for a native. The large bud is a marked characteristic of the foreign varieties. The bark of the Delaware has the deep striated appearance of all our natives, with a hard silicious covering, perhaps the hardest of all, not excepting the Concord, which it resembles in color. It is nearly destitute of bloom, which is always upon the wood of the Traminer. Toward the end of the shoots, the Delaware exhibits the peculiar hairiness which is another characteristic of the native vine. The Traminer has a soft wood, with large, light-colored spots upon it, especially when grown in the open air, and is quite tender in this latitude, killing to the ground unless protected, while the Delaware is as hardy as any of the wild fox-grapes. The Traminer has a thin ruffled leaf, difficult to press flat without its lobes overlapping or splitting. The Delaware is perfectly flat, thick, and leathery, like the Catawba, Diana, Concord, and Anna. All of these have thick leaves, and are not liable to sun-scald or mildew, while the Isabella, Rebecca, and some others have thin leaves, and are subject to this disease unless grown under very favorable circumstances. The mildew is not likely to attack a perfectly healthy native vine, and it generally attacks them at the time of cold, cloudy weather, when the leaves have become weak from the want of sun; therefore it will be seen that vines, to be healthy, must have a full exposure to the sun if you would keep them free from this malady. Weak growers are not likely to have well-ripened wood and leaves the first year from cuttings, unless assisted by artificial heat, consequently they have unripened roots. The Traminer does not ripen its wood in the open air, while the Delaware does perfectly. It is quite difficult to make the Delaware strike roots from cuttings; the Traminer strikes very readily. The mildew that attacks our native vines is quite different from that which attacks the foreign. The one that attacks the foreign commences on the upper surface, and passes to the peduncle, and thence to the fruit, and is of a dark color. The one to which our native varieties are liable appears more gross, presenting the appearance of small transparent bladders or minute pearls, that are disposed to attach themselves along the middle of the leaf on the under side, consequently they often destroy it before a person is aware of what is the matter. This native mildew and sun-scald are mutually disposed toward each other; that is, if a plant is weakened by sun-scald, it is particularly predisposed to be attacked by mildew, and a plant upon which mildew fastens is obnoxious to sun-scald, as its life-blood is sucked out by this parasitic plant. The fruit of the Traminer does not resemble the Delaware as much as a Baldwin apple does a Spitzenberg, and one who can see a difference between these, would not find it difficult to distinguish the grapes. If you will pick the Delaware before it is quite ripe, you will find that the skin parts readily from the flesh like the other natives; the Traminer adheres to the flesh the same as others of its class. If you allow young vines of the Delaware to mature all the fruit that sets, they will have quite a tough pulp, and have that peculiar foxiness which no foreign grape ever had"

725. **The Isabella Grape—Is it a Seedling?—The Catawba.**—It is stated that the original location of the Isabella grape was Newbern, N. C. It was brought to Brooklyn in 1818, but it is not known whether the grape brought from North Carolina was a seedling or the original of the variety.

One of the great difficulties of growing seedlings from any native fruit is to get it to vary from the wild sort. There is no difficulty in getting variations from those cultivated or improved. When a variation is once obtained from any seedling, it is very easy to continue this variation, and produce something better.

The best proof that the genuine Isabella is not an ordinary seedling is its high character, so different from the wild Fox grapes. It is important that the country should know if it is a fact that this variety of grapes is failing, or diseased so as to be more difficult to grow than other sorts. By many persons it is stated as an incontrovertible fact, that the Isabella grape is diseased, and that it is not worth while for any one to plant a vineyard of Isabella vines in their present unhealthy condition.

William S. Carpenter states that he has taken much pains to grow them, and has not had a good bunch of Isabellas for five years. He has tried both close pruning and no pruning, and his pruned vines produced quite as well as the unpruned, which proved the assertion false, that the failure is owing to injury from close pruning.

Mr. Pardee states that he saw five distinct sorts exhibited at one fair all labeled Isabella. Of course these were seedlings, and though like the original, were not the pure sort. With so many grapes called by one name, how is any one sure of getting the true Isabella?

The Catawba is supposed to be like the Isabella, a native wild grape of the Southern States, and it is now considerably cultivated in Georgia and the Carolinas. It was introduced North about 1830, and since has been our principal wine grape. It flourishes best away from the moisture of the seacoast in the dry climate west of the Alleghanies, and at this time thousands of acres at the West are devoted to this crop.

Geo. Hustman, well known as one of the most intelligent grape-growers in Missouri, thinks "the Catawba should be struck from the list as unworthy of cultivation, because it is superseded by better sorts. The same is certainly true of the Isabella hereabout."

Ira Smith, of Peoria, Ill., under date August 16, 1860, says:

"I have a hundred Catawba grapevines, which I cultivate on poles the usual way. Having all my grapes destroyed last spring by a late frost, and being desirous to increase the number of vines to enlarge my vineyard, I buried all my last year's wood and allowed an extra vine on each trunk to grow from a point near the ground, which I have also buried. The side branches of the old and new vines are taking root and growing finely, and have not at all hindered a heavy growth for next year's fruit of from two to three vines climbing up the poles; but some of my neighbors inform me that the side branches, commonly called *suckers*, will not produce good bearing vines."

This is a mistake. It will not make the least difference whether the bearing vines are taken from such suckers as the writer mentions or from the main stalks.

The Isabella grape flourishes finely upon Kelly's Island, in Lake Erie, in the neighborhood of Sandusky, Ohio. In 1860 it was estimated that nearly one tenth of the land on the island, or 230 acres, had been planted in vines. This is in lat. $41\frac{1}{2}°$, but the climate is ameliorated by the proximity of the water, the land not being elevated much above the lake. As a general thing, it is not safe to depend upon the Isabella or Catawba as far north as lat. 41° for a market fruit crop or for wine.

The most successful grower of these two varieties in the vicinity of New York city is Dr. Underhill, at Croton Point, thirty-five miles up the Hudson, where the vineyard is almost surrounded by water, and is but slightly elevated above it; the soil a sandy loam, which has been deeply trenched and fertilized by immense quantities of muck dug from a marsh that has been subject to tide-water overflow. The same thing is true of the vineyard of Dr. Grant, upon Iona Island, about ten miles farther up the Hudson. His land has been made homogeneous by trenching three feet deep, and working in muck and manure compost. Upon such land in favorable situations, below lat. 41°, the Isabella and Catawba can be grown; but even as far south as Maryland, as appears from the testimony of many persons, other sorts are preferred.

726. **How to Grow Grape Cuttings.**—The most difficult thing with those who have no experience about grape culture is to get a start from cuttings, which, they are told, are just as good as rooted vines. So they may be to those who know how to use them. The following plan of an amateur grape-grower appears to be a good one:

"Have a box two feet high and about two and a half feet wide—the length as you require; fill half full of well-pulverized soil; prepare the cuttings with three eyes; cut smooth below the bottom one; place them in a slanting position, with the last bud just above the soil; nail a thin piece of cotton cloth tightly over the box; give warm soft water freely every evening. Place the box in a sunny nook, and in a few weeks it will be filled with grapevines ready for potting or planting in borders."

727. **The Hardiness of Varieties of Grapevines in Winter.**—The following statement, published in 1860 in the *Genesee Farmer*, shows how the winter affects different kinds of grapevines at Rochester:

"In the garden of a gentleman in this city there is a long trellis, on which are grown several vines of Isabella, one of Delaware, one of Rebecca, one of Diana, one of To Kalon, and one of Hartford Prolific—all having the same exposure.

"The vines are pruned early in the winter, and left tied up without any protection, and are all from six to eight feet in hight, with laterals.

"Most of the buds of the Isabella are killed from the tops of the vines to a line within two feet of the ground. This is particularly the case on young wood of last year's growth, and many of these canes, even, are dead.

"The Diana suffered fully as severely as the Isabella, and shows live buds only on the lower part of the vine.

"The Rebecca and the Hartford Prolific were killed entirely, buds and wood, within a foot of the ground.

"The Delaware is entirely uninjured; every inch of wood is perfect to the very tips, and all the buds are now bursting.

"The To Kalon is uninjured, and is as hardy as the Delaware.

"This test we consider a very fair one, and it must place the Delaware—combining, as it now appears, superior quality with maturity and great hardiness—at the head of all our varieties of native grapes."

At Utica, a vine obtained by a Mr. Foster from New Jersey, without a name, almost as long ago as one of the same sort was taken to Delaware, Ohio, proved to be the true Delaware, and stood eighteen years unprotected, and never failed to yield him a full crop of most luscious grapes annually, and had always ripened before our early frosts.

728. **Five Grapes in their Order of Excellence.**—A correspondent of the *American Farmer*, whose experience entitles his opinion to respect, furnishes the following list of grapes, the merits of which are given in numerical order:

"1. *Delaware.*—Bunches and berries medium size, round, red; ripens four weeks earlier than the Isabella; of the highest excellence as to quality, hardiness, and productiveness. Its right eminently to the first rank is generally conceded by all who have learned its value.

"2. *Diana.*—Bunches large, mostly shouldered; berries large, round, red; vine vigorous and productive; ripens two weeks later than the Delaware, and approaches it in excellence, both for table use and for wine. If grown in a small space, must be root-pruned at the end of the first season, and if very vigorous, at the end of the second.

"3. *Anna.*—A white grape of the highest flavor; bunches and berries medium to large; vine hardy and productive. It begins to ripen as early as the Diana, but does not progress so rapidly, but is much earlier than the Catawba, and greatly surpassing it in rich vinous flavor.

"4. *Herbemont.*—An immense grower, and the most ornamental of all our out-door vines; perfectly hardy south of New York; its berries are medium or small in size; color deep purple, covered with bloom; the bunches are very large. Its rich, spicy, vinous flavor is very distinct and of the greatest excellence. It is fitly described by Downing, who says its berries are bags of wine. An admirable variety for the latitude of New York city and farther south. In texture and flavor it may stand in comparison with the best European varieties.

"5. *Lenoir.*—All that has been said of the Herbemont will apply generally to this variety, except that the Lenoir is much earlier, ripening at least two weeks before the Isabella. Its fruit is very sweet, rich, spicy, and vinous, and has a very high character for wine as well as for table use.

"The *Rebecca* would deserve all commendation for the garden, were it not that its leaves, which are not abundant, like those of the Isabella, in most localities, are subject to mildew in unfavorable seasons.

"There are two other varieties that should not be passed without a word, since few who have gardens would like to be without them, viz.:

"*Union Village*—which originated with the Shakers at a place of that name near Cincinnati, Ohio, and was introduced by Mr. Longworth. In appearance it is like a monstrous Isabella, and resembles it in flavor, but is richer, and ripens at least one week sooner. In bunch and berry it may be represented as twice the size of that variety.

"The other is the—

"*Elsingburg.*—This is directly the reverse of the above, having small berries, but of the highest flavor, and of a decided European character, but it is hardy, early, and productive; with care, its long shouldered bunches become very handsome; fruit sweet, spicy, and delicious.

"The skin of the Herbemont, Lenoir, and Elsingburg adheres firmly to the flesh, like all of the foreign varieties."

729. **Diseases of Grapes—Remedy for the Rot.**—The following remedy for the rot, and the reason why it is a remedy, is translated from the *Kölnische Zeitung:*

"Dr. Franz Vulkan, of Eppan, in the Tyrol, having learned by experience that the parasites of vegetables can not exist on animal matter, has discovered a remedy for the grape disease. He dissolved two and a half pounds of common glue in ten gallons of water by boiling, and then cooled the solution until it was neither stiff nor yet too watery, but had the appearance of lye. Diseased grapes were dipped in this solution, and after forty-eight hours they assumed a lustrous, dark-green color, like that of those which had not been attacked. In September they ripened into the finest fruit. To make sure that it was that solution which produced the desired result, he selected three bunches on the same branch; he dipped the whole of the first, half of the second, and the third not at all. The first was entirely untouched, the second as far as it had been dipped, the third remained diseased, and in four weeks burst and rotted. On another vine, where branches, leaves, and fruit were infected in the highest degree, a similar experiment produced a similar result. In places where large tracts of vines were struck with the blight, single clusters were dipped, and these were healthy and gave very fine fruit, while all the rest rotted. Perhaps the sprinkling of potato vines might be equally successful. The cheapness of that remedy commends it to general use."

Mr. Bullock Webster, of England, writes from Athens that the application of sulphur has proved most successful in Greece upon grapes, potatoes, beans, peas, fruit-trees, roses, etc. The sulphur ought to be applied in a very fine powder in the early stage of the growth of the plant, as soon as any blight shows itself, either by means of a large tin pepper-box or small bellows, by which a woman can dress an acre of vines per day. Should rain fall within five days after the application of the sulphur, the operation has to be repeated.

A French journal recommends removing the grape disease by brushing off the fungus with a soft wing of a bird. The bunches appear covered with a dust which is easily brushed off. In the experiments tried, the bunches brushed perfected themselves, while those unbrushed entirely failed.

In this section, a small caterpillar some seasons trims off the bunches of grapes. Perhaps it is only a provision of nature to prevent over-bearing. Wm. Aldrich, in a letter to the *Gardener's Monthly*, relates a curious fact in relation to the effect of different trees upon the healthiness of vines. He says: "A neighbor of mine has an Isabella grape on a Balm of Gilead tree, bearing full crops of grapes, while vines on a Black locust generally rotted. Another neighbor had a vine, one branch of which extended from a locust-tree to a Balm of Gilead tree, with the same result between the different branches of the same vine, though on the two respective kinds of trees."

730. **Hints upon Planting, Pruning, Fertilizing, and general Care of Grape-vines.**—Those who have neither the time nor the taste to carry out any particular system need not be fearful of producing plenty of fruit if they follow the one cardinal rule, of not allowing any old wood to accumulate, for that never bears a second time. This should be ever kept in view, for though a vine may extend its shoots a hundred feet, or be traind to a four-foot stake, it will bear just in proportion to its strength.

It has been urged that our native grapes were more injured by pruning than the exotic vines; but whether this is so or not, remains to be fully proved. The rot which attacks the Catawba and other natives has been attributed by some to the French system of pruning, though not many experiments have been made to prove it. The foreign vine is, as a general rule, much more subject to disease here than our native sorts. We have no doubt that much in regard to health as well as fruitfulness depends upon pruning and proper training.

The importance of system in the treatment of the vine, both under glass and in the open air, is therefore apparent. And independent of those facilities which attend it, the beauty which comes from method is a powerful reason that we should practice it. With the adoption of system, the same course of pruning is pursued year after year. When the vine is pruned once, it is pruned again without much trouble; a fresh exertion of judgment is not necessary that too much should not be taken away here or there, and after all, the result be unsatisfactory.

The land for grapevines must be deeply disintegrated. It is idle to plant them in hard ground, or stick them into holes dug or punched in a stiff soil. There is no preparation equal to trenching with a spade three feet deep. The next best preparation is by the double plow, reversing the top soil fifteen inches, and stirring the subsoil ten or fifteen inches more with the subsoil lifter. The very best manure for grapevines is swamp muck, composted with animal substances.

The ground intended for a vineyard should be well manured the previous year, either by a coating of lime, where that kind of manuring is proper, or by gypsum, where it can be had; or by plowing under some green-sward, such as clover; or, at least, by a good and thorough coat of manure, straw, or even leaves.

Afterward the surface, for the depth of twelve inches, should be turned beneath the next twelve inches with the spade, or if stony, with the mattock. For this purpose a trench is first dug four feet wide, and to the depth to which the vineyard-man is going to spade up and trench his vineyard.

It is far better to have a small, good vineyard, than a large poor one.

The ground thus spaded up should be permitted to settle well before the vines are planted. One or two good rains will generally accomplish this. The best method is to trench in the fall and plant in the spring.

We are all too apt to trust to the virgin richness of our soil, and in our confidence are apt to forget that spading up the ground for several feet is done for other reasons besides mere fertilizing; the present surface-soil being full of decomposed vegetable matter, is the hot-bed of all manner of insects.

In many parts of Europe they spade up the ground to the depth of three and four, and even five feet. We never prepare the ground itself during the preceding year, while in Europe it is tended in clover with good coatings of gypsum and manure.

Some soils are naturally rich and deep, but we would sooner trust to a hard, rocky, or gravelly soil that required digging with a mattock to the necessary depth.

In vineyards along hillsides it is well to use the stones for the purpose of erecting walls. Where stones are lacking, you may raise banks by sodding them. They are not as good as stone walls, since the green-sward is apt to subject the neighboring vines to frost, but the ground must be protected from washing even at this risk.

Some persons suppose that throwing old logs, brushwood, or stones underneath, promotes the growth of vines. They may not hinder them, if well packed with ground, but great care should be had not to leave vacuities, as they are sure to impart to the roots an unhealthy state.

One successful vine-grower throws in a layer of corn stalks or brush, cut with the leaves on in summer, at the bottom of the trench. This serves as a partial underdrain, and also as a manure.

George Husman, of Missouri, says:

"The best situations are generally our hillsides, with an eastern, southeastern, or southern exposure. The freer the location, and the more exposed to the draft of our prevalent winds in summer, the better. The slopes adjoining small water-courses should be particularly avoided, as they are peculiarly subject to frosts in winter and spring, and also, generally, to mildew and rot.

"The soil best suited for the vine is a dry, calcareous loam, with a porous subsoil. Any soil retentive of moisture, for example, wet, stiff clay, or wet, spongy land of any kind, should be avoided, as the grapes are much more subject to mildew and rot on such soils, and the vines are apt to make a rampant, unhealthy growth.

"If you intend to make a plantation of cuttings, they should be made of sound, well-ripened, young wood, and contain at least four eyes or joints; cut them off close below the lower eye, and about an inch above the upper; if a heel of the old wood is left attached, so much the better. They should be cut in autumn, tied in bundles, and buried in the ground until wanted for planting. This refers, of course, only to such varieties as Catawba, Isabella, and other kinds which will grow from cuttings. Many of our most valuable kinds, such as Norton's Virginia, Delaware, and others, will not grow from cuttings, and must be propagated by layering or grafting. Most of those varieties which have very firm hard wood and but little pith will not propagate readily from cuttings.

"As a general thing, rooted plants are very much to be preferred whenever they can be obtained at a moderate cost. The first summer after planting, nothing is necessary but to keep the ground free from weeds, and the surface well pulverized, either with the hoe, cultivator, or plow. Should the vines grow very strong, they may be tied to the stakes used for marking off the ground, and only one shoot be allowed to grow. The next winter, stakes should be provided. Here, again, opinions differ, some preferring simple stakes, others prefer trellis. The latter is undoubtedly the best, and also the cheapest, if well made in the following manner: Take cedar posts, where they can be had; if not, mulberry, walnut, locust, white oak, or any other durable timber, split up to about three inches in diameter and seven feet long. Point one end, and make holes with a crowbar two feet deep in the spaces between the vines, setting the stakes firmly. To these stakes nail three laths, one about two feet from the ground, the others eighteen inches apart. They can be split of black oak, one inch broad by half an inch thick. Provided the stakes are made of durable timber, such a trellis will last from ten to fifteen years; is much more convenient for tying the vines and training the young wood to them, and will prove the cheapest in the long run.

"The after-culture of the ground is precisely as in the first and second years. It is generally observed as a rule that, during wet seasons, the ground should be kept clean and smooth, stirring but little. During dry seasons, the ground should be drawn up to the vines and well stirred. Should a vineyard show a decrease in vigor, it can be manured by digging a small trench just above the vines, laying in manure, and covering up again with a plow or spade.

"Vegetable manure and compost I should consider most suitable; but good decomposed stable-yard manure will also do. Ashes are, no doubt, very beneficial to the vines.

"After the third year the vine may be considered as established, and a full crop expected. It is in pruning now that the nicest judgment, as to the capabilities of each vine for bearing, is required, as the success of the vintner in raising a good crop, and also preserving his vines in a healthy condition, depends principally on judicious pruning.

"Pruning is best done late in autumn or early winter, but it can be followed up all winter until the 1st of March, though it is best in autumn, as it will prevent all flow of sap, and the cuttings are also better if required for propagating."

Summer pruning is earnestly recommended by Andrew S. Fuller, of Brooklyn, N. Y. He says:

"By summer pruning we do not mean the cutting off of large branches, but a system of pinching or stopping the young shoots with the finger and thumb, which is called summer pruning. When a vine is planted, we should never allow but one shoot to grow upon it the first season, and never allow any side-shoots or laterals to grow any length; if we do, the bud at the axil of the leaf where this lateral springs, which is the embryo fruit-branch for the coming season, will be very much injured, if not entirely destroyed; besides, the sap will be distributed through many small branches, instead of being concentrated into one strong shoot.

"In all modes of training, this operation is necessary for directing the vital principle and proper maturation of the plant. It is not only an economical operation, saving much labor that would be otherwise lost if the vines were left until the annual pruning, but by concentrating the sap into that particular portion of the vine where it is needed, we are able to produce a much larger quantity of superior fruit than we otherwise should.

"The operation of pinching off the laterals is generally performed thus: When they have pushed out and formed one or two leaves, then the end is pinched off, leaving one leaf; when they have pushed again, pinch again, and leave another leaf, and so on as long as the vine continues to grow. This keeps them in check, and by leaving occasionally a leaf it does not deprive the vine of so many leaves as it would if the laterals were broken off close to the main stem, as is sometimes done, and as we may safely do at the beginning of the season; but at midsummer, and later in the season, there is danger of forcing out the next season's fruit-bud, which is at the base of the lateral, and when this is done, of course you lose your next season's crop. This summer-pinching has always been an operation that was strictly attended to in all well-regulated vineyards in all ages.

"It was called, in olden times, pampinating—taken from the word pampinus, a young shoot; in later days, weeding the vines. Columella says that we should suspend the operation while the vines are in flower, for fear of destroying the embryo fruit—an idea worth remembering. The main shoot may be stopped when it arrives at the proper hight, and then let the uppermost buds push out and grow for a while, and then check these. By doing so we can often make our vines much stronger in growth than they would otherwise be if this was not done, besides ripening their wood thoroughly. If we allow all the laterals or side-branches to grow on a vine, and by doing so divide and subdivide the nutriment which it receives through its roots, we shall then have many small and weak branches, none of which will be strong enough to fully develop or mature their fruit.

"In our northern latitude we have always observed that, when vines were allowed to grow in this way, these small shoots were never well ripened when the cold weather came, and the consequences were we had immature wood and immature roots, both of which were destroyed by the cold weather. For it is indisputable that unless a vine is made to mature all its branches by the time cold weather comes, a corresponding number of its roots will also be unripe. To this cause alone a great proportion of the failures in vine culture in this vicinity can be attributed. Further, when we come to the annual pruning, if we have one hundred branches to cut off we make one hundred wounds, each one of which will take a certain amount of alburnum to heal over, and thereby cause a vast amount of the strength of the vine to be directed to this purpose, which might have been used in furnishing food for new wood and fruit had there not been more than one tenth of that number of wounds, which is all that would have been necessary if the vine had been properly summer-pruned.

"No definite rule can be given that will be applicable in every case, for some vines will grow strong and others weak; some disposed to throw out many branches, others few; besides, each different mode of training will require summer pruning consistent with the plan adopted.

"In some modes of training it is found quite beneficial to pinch off the end of the fruit-bearing branch three or four leaves beyond the last bunch formed; in other modes it would be very injudicious. But in pruning, as well as in all other operations in the vineyard, the operator must fully understand what he wishes to accomplish, knowing that certain causes will produce certain results. Those who believe that nature is the best teacher, and therefore leave their vines to ramble without check or restraint, would do well to remember that our cultivated fruits are no longer wild plants, but have, in a great measure, changed their natures, and have become somewhat artificial and no longer in their normal state.

"The objects of pruning are various; among the most prominent are, promoting the formation of fruit-buds; lessening bulk; modifying form; promoting growth; increasing the size and proper distribution of the fruit among the branches; creating an equilibrium between root and stem; removal of diseased portions of the plant, etc., all of which should be kept constantly in view when the operation of pruning is being performed, for by doing it we will save much time and be more likely to produce the intended results.

"There are various opinions in regard to the best form in which vines should be trained; but all of them that have been successful for any considerable length of time have been founded upon the same principles. All successful plans are commenced by a gradual accumulation of wood from two to six years, at which time the structure may be considered as finished, after which the vine is not allowed to extend, always pruning it to the same point as nearly as possible from year to year.

"The vine is thus made to produce its fruit very near the old wood. This is very important when high-flavored fruit is desired. The importance of having old or matured wood in close proximity to the fruit is a principle so generally conceded to be true by experienced vine-growers, that in the best wine districts of Europe they seldom attempt to make wine for the purpose of testing the quality of a variety until the vine has been established for several years. It is necessary to have old or well-matured wood as a basis upon which to grow your fruit. A superabundant quantity, instead of being beneficial, is deleterious.

"This is one reason why all the various plans that have had for their object the entire renewal of the vine biennially or triennially from the same root have been discarded when thoroughly tried. These renewal plans have often been brought forward by theorists, but what is equally true, none of them have succeeded, and at the present time not one of them is in successful operation.

"Another difficulty which we have had to contend with, when growing vines on these renewal plans, is that we are obliged to resort to such severe pruning at the time of renewal, that we destroy the equilibrium between root and top. When the vine has become fully established (say from five to ten years, and no vine can be considered as established in less time), it is with great difficulty that it can be restrained sufficiently to produce a healthy shoot from the one eye or bud to which it is pruned.

"The large amount of food which will be accumulated in the roots of a healthy vine, and is constantly being collected by them, can not find employment, and the new shoots or shoot which put forth can not consume this superabundant supply, and a sort of plethora is produced. A portion of the roots becomes inactive, and consequently decay.

"Let any one examine the stump of a large tree that has been cut down, and he will see this fully demonstrated. A few trifling shoots may be produced which will grow rapidly, but the greater portion of the old roots will die in consequence of the sudden check which they have received. Some varieties of trees will not produce sprouts at all from the old root when the top has been cut away, while others will produce them in abundance.

"We believe the only true mode of renewing the entire vine, when it has become enfeebled by age or accident, is by layering a portion of its young shoots. This is the general and successful method practiced in old and established vineyards.

"The first pruning a nursery vine receives is when it is transplanted, at which time it should be cut down to one eye or bud above the ground, from which one shoot is allowed to grow. This should be kept tied to a stake, all side shoots, or laterals, as they are termed, plucked off, leaving one leaf on them the first time; if they start again, pinch them off, leaving another leaf, and so on through the growing season.

"The second year the vine is down to two buds, if strong, but if weak, cut again to one bud, and repeat the operation as the first year. When the vine makes a strong growth the first season, it may be safely cut back to two buds, and from there we allow two shoots to grow, which must be attended to during their growth, such as tying to stakes, or trellis, and pinching off laterals, as was done the first year.

"The third year we are supposed to have two strong shoots from one root, and we are now ready to adopt the plan on which we intend to train our vine. Nearly all the systems now in use start from this point, whether it be the bow system, thomery, or the common trellis plan; this seems to be the starting-point for them all.

"A very simple plan, and one which is peculiarly adapted for a trellis, is formed by bending down the shoots which we should have on our vine at the end of the second or third year, to form horizontal arms, leaving them about two feet long. The shoot that grows from the end bud we save for continuing the arm next season; but it should not be lengthened more than two feet in any one season. Only the number of buds required for the upright shoots should be left to grow upon these arms. The upright shoots are to be cut down to one or two eyes every year, and from the young shoots that spring from these we obtain our fruits.

"Another mode is to cut down every alternate shoot to one eye, and the others to four or five, the long canes bearing several bunches, and the others none. Next season this order is reversed, those bearing this year bear none the next, and so on.

"Sometimes a vine is planted in a trench five or six feet from the trellis or wall on which it is to be trained, and each year a portion of the vine, say two feet, is layered, and thus we go on, step by step, until we reach the trellis, and have formed our two shoots for arms. The object of this layering is to get a large quantity of root before the vine is called upon to produce a large quantity of fruit. There is a sufficient amount of top allowed to remain on the vine each year (which is also allowed to bear fruit) to keep the roots active and healthy. Whatever system you adopt, let it be vigorously adhered to until you succeed or fail; and in case the latter is your fate, you may confer a great favor upon others by doing so, for it is often the case that the failure of one man is of more benefit to the community than the success of many. If you do not adhere to the one system that you start with, we can not tell whether it was your neglect or the fault of the system that caused the failure. Of course we are supposing that there is no fault in the variety or in the cultivation."

Mr. Fuller advocates the single eye system for propagation, as likely to produce the best vines in the shortest time. The old wood serves to nourish the new shoot until it can send out new roots to sustain itself. The best plan for training vines for family use is upon trellises. No vine should ever be trained upon an arbor for any other purpose than a shade. Never use an arbor to grow fruit. It is very difficult to arrange an old vine into any good shape; to make a good one, you must start aright with a new vine. Upon whatever plan you train your vines, make your fruit grow close to the ground—that is, within reach without using a fireman's ladder. He gives the following as the philosophy of autumn pruning:

"During active growth of leaves and stems the liquid portion of the sap is exhaled almost as fast as it enters the vine. When cold weather first checks growth, it does not affect the roots, which continue absorbing food. In autumn, then, the vine becomes surcharged with sap, which, during winter, undergoing its natural change, would deposit solid matter throughout the entire length of the vine, so that each bud would be equally supplied with its quota of food to commence vegetation anew in spring. Now, suppose a portion of the vine is cut away in the fall or early winter, it is apparent that what remains has the whole root for its support, and it may receive all the strength that would have been diffused throughout the unpruned vine. These few buds will of course put forth in spring much more vigorously, and continue to send out fruit-bearing wood in greater perfection than it is possible for an unpruned vine to do.

"The rule for pruning, then, should be: If the vine is weak, prune early, that is, as soon as it sheds its leaves. If your vine bears fruit, and is not a vigorous grower of wood, and you wish it to produce more, prune early. If your vine is a vigorous grower, but a shy bearer, prune late. If severe cold may soon be expected, at the time you are pruning do not cut the cane near a bud, but several inches above it. If desirable, you can cut away the spur above the bud after cold weather is past. The growth of wood or fruit is regulated more by pruning than by the soil in which the vine is grown.

"It may be set down as a fact, that no vine in the climate of New York can ripen a crop of fruit upon all the wood its roots will produce."

In pruning, the vintner should have a two-fold object in view. First, to raise a good crop of well-developed and well-ripened fruit; secondly, to get a supply of strong, well-ripened young wood, to give a good crop next season.

Dr. Underhill says:

"It depends upon the richness of the soil about summer pruning. If the soil is very rich, there is danger of the fruit-buds starting as soon as the laterals are pinched in. If the laterals and leaders are both pinched off, the tendency will be, in a strong, growing vine, to send out the fruit-bud forming, so as to have new grapes in autumn and no crop next year. In moderately fertile soil, the Isabella will bear pinching in pretty closely, but not upon highly fertilized vineyards. I do not of late stop the growth of my Isabellas. I think the practice of summer pruning inapplicable to the Isabella variety and all other strong growing plants.

"The Catawba grows its wood more firmly, and admits the German cultivation better than the Isabella. No grape but one of slow growth will bear to be cultivated entirely on the renewal system. I would put new plants into generous soil, and give them all the growth I could to ripen the wood thoroughly. Still, it is not best at any time to drive the growth of a vine too fast. A rapid growing vine, or a vineyard forced by high manuring, will not make as good wine as one of slower growth. Bones and compost of muck and yard manure are the best fertilizers. I never use guano, nor any very heating manures, such as that from the hen-house or pig-pen."

The advantage of taking off laterals off a very rapid-growing vine is to give the fruit more sun and air.

"In 1860 it was estimated that there were about four thousand acres laid out in vineyards in the State of Ohio, of which nearly one half were in the immediate vicinity of Cincinnati, and with good weather that the yield would be 1,600,000 gallons of wine.

"Propagating choice vines by layering should be practiced by all. When trimming your vines in the fall, save one or more of the canes of well-matured wood, and in the spring dig and manure the ground in a line for a trench, in which to lay down the vine, which at first you may cover about two inches deep. Drive some pegs over the vine to keep it fast, and when the eyes have sprouted and grown a foot or so high, tie them to stakes, and earth up around the base, and repeat this from time to time until the layer is six inches deep. The result will be that each upright will become firmly rooted, and be a good vine for transplanting next season."

731. **What is a Merchantable Grapevine?**—A vine with a stem no bigger than a straw is not a fair merchantable vine. Such a vine, of one of the very rare sorts, may be sold to a purchaser present who perfectly understands what he is buying, but should not be sent out to fill orders. Neither should a stump of a vine, upon which a few roots have been forced to grow in a hot-house pot. No definite rule can be adopted as to the size of vines, because there is a great variation in growth of different varieties. The Isabella, the Catawba, the Concord, the Northern Muscadine, the Hartford Prolific, and some others, are strong-growing, rather coarse, woody vines, which at two years old might be twice as large as a good Delaware, Diana, Rebecca, Anna, or some other sort that does not make wood fast while growing. The Delaware, in particular, grows a small, hard, wiry vine, very hardy, and well rooted.

A No. 1 Delaware vine, from an honest nurseryman, will have a cane as large as a pipe-stem, with three good eyes and a mass of fibrous roots, which will require a hole twelve to eighteen inches across to spread them out in, as they should always be in planting a vine. The Diana, Rebecca, Lenoir, and Anna are of the same character of growth, and should be of the same size to be "merchantable."

The Catawba, Isabella, Herbemont, Concord, Hartford Prolific, Union Village, Canby's August, etc., being vines of a stronger growth, should be, when sold from nurseries, the size of one's little finger, with either entire canes or three eyes and plenty of roots. Such vines may be taken as a fair standard, and people who are anxious to plant vines should not be cheated by having inferior ones palmed off upon them. It is that which discourages them, and sets back the grape cultivation more than all we have said in its favor for years can set it forward.

732. **Grape Culture in California.**—In no other part of the United States has grape culture advanced with such rapid strides as it has, or rather does (1861), in California. The *California Farmer* of September 7, 1860, speaks of a vineyard which the editor visited in Sonoma, on the estate of Gen. Vallejo, managed by Mr. Ryan, that looks like rivaling in a short time some of the large vineyards of Europe. It says:

"The old vineyard called *Lachryma Monte*, or 'Mountain of Tears,' was planted with about 3,000 vines by the old Jesuits. The trunks of the vines are now like trees; the balance of this vineyard—7,000 vines—was planted in the years '56, '57, and '58.

"The new vineyard, which contains 20,000 vines of California grape, and 5,000 foreign varieties, was all planted on subsoiled ground thoroughly prepared, twenty to twenty-four inches deep, and these vines are now doing admirably.

"Dr. Victor Fourze is the vintner, and the wine vaults are five in number; four are 22 by 50 feet, and one 20 by 40 feet; the buildings are adobe, very thick walls, floors double, and admirably fitted up as wine cellars. The stock on had now is about 8,000 gallons, and several parcels bottled of wine of '56 to '60. The amount anticipated this year is 15,000 gallons, and he will make 5,000 or 6,000 bottles of champagne, besides 200 gallons of brandy.

"Col. Harasztby's vineyard is on a tract of mountainous land of about 5,000 acres. The vineyard covers 260 acres in all. There are now 80 acres in bearing, with 680 vines to the acre, set 8 by 8 feet, which is the proper distance. The vines bore well last year, and made 4,000 gallons No. 1 wine. They will make this year 60,000 gallons, valued at $1 50 the gallon, or $90,000. Some lots of vines averaged forty pounds per vine, and there were vines that gave 300 pounds; these were California grapes. Col. Harasztby has already one hundred and eighty-six kinds of foreign vines, but has tested only thirty-six kinds. He has already contracted to deliver to Messrs. Grossinger, of San Francisco, 300,000 pounds of grapes this year at 3½ cents per pound, four miles from the vineyard, the purchasers to find boxes. This will establish the value of grapes at wholesale for wine purposes.

"The wine cellars of Col. Harasztby are made into the hill, composed of concrete matter, chalk, lime, blue clay, and gravel stone. There are two cellars now, one is forty feet deep and the other one hundred feet deep. There is a new one building, which is to be 400 feet deep; the first one is fourteen feet wide and eight feet high, the last will be sixteen feet wide and seven and a half feet high. These are grand and complete cellars, being moist and dark. The temperature will be uniform; it should be sixty degrees, and moist. Some persons object to moisture in wine cellars because the casks decay, but the gain to the wine and less loss doubles the loss on casks, as the evaporation of wine in dry cellars is great; in moist cellars the loss on a sixty-gallon cask is only one half gallon; in a dry cellar, one and one half gallons.

"The experience of Col. Harasztby is, that foreign vines are superior to the California grape for wine, and he will not plant any more California vines. There have been planted in Sonoma more than 1,000 acres.

"It is getting to be so common a thing in California to find vineyards of eight or ten thousand vines, that they are not deemed particularly worthy of notice. So rapid is the increase of vines, and the manufactures of wine in this State, that the day is not distant when ships sent with cargoes—if they have anything to send—from New York will return freighted with wine-casks, and California wine will be as common in this city as wine from France. It is also asserted that raisins can be manufactured in California, and will be as soon as the price of labor finds a level corresponding with other grape-growing countries.

"In France, a first-rate crop of grapes is 5,000 lbs. per acre, while 2,000 lbs. is regarded a fair crop. In the grape-growing districts along the Ohio River, where a superior grape is produced, 8,000 lbs. is considered a very large crop—4,000 to 5,000 lbs. is regarded as a good average; but in California, the ordinary crop is from 10,000 to 13,000 lbs. to the acre, and more is not unusual.

"In the Old World, and in the Atlantic States, the grape crop frequently fails on account of frosts and disease; here, it is sure to yield abundantly. There, the vine must generally be supported by poles; here, it stands without artificial aid. There, a large amount of cultivation is costly; here, it can be had for almost nothing. There, the rains frequently interfere seriously with the ripening and gathering; here, during the vintage, we have an unclouded sky. The returns of last year show the grape crop to have been 51,000 tuns, and the wine product 300,000 gallons, besides a large quantity of brandy."

733. **Grape Culture in Austria.**—Although European culture is not altogether appropriate to this country, we think there are some things stated in the following excellent letter from Austria, written by A. Hamilton Gilberts, that are well worthy of preservation in this volume. He says:

"At the first planting of a vineyard in this country they invariably use cuttings—so invariably that they would throw away a root and take a good cutting from the vine to set out in preference. The manner of setting out or planting is to dig a hole in the ground three feet long by two feet wide, and the rule for the depth is, as deep as to a man's knee; and the cuttings they use are the length across the bottom of the hole, up the side, and lying against the side to the top of the earth. They then put into this hole about five cuttings, spread along about two feet, the ends reaching six or eight inches above ground. The man then stands in the hole on the vines and cuts in the standing sides of the hole, treading the earth close upon the vine about six inches deep, and then hauls the balance of the earth in, and fills the hole up a little rounding. It is usual to throw in a handful of wheat among the cuttings before filling in the earth. Its value I do not know. The cutting in the side earth is to give a large, loose area to the roots.

"They put in five cuttings to insure vines enough. They make the holes about nine to eleven feet apart in the rows, and the rows about twelve to fifteen feet apart.

"The first and second year nothing is done to the vine except to keep the ground loose and free from weeds.

"Between the rows they usually sow wheat or oats, or plant corn; and I notice they always plow a shallow furrow one foot from the vines, and turn the earth away. If they do not plow they make this trench with a hoe.

"The third spring from setting out they trim the shoots down very close—say, leave one or two leaf-buds and set sticks to train the vine to, or what is more usual, they plant with the cuttings a slip of a tree, somewhat resembling the Lombardy poplar, which they head down, and only use to support the stock. This third year the vines yield a few grapes. The spring of the fourth year they take two or three of the most vigorous vines and bend them over about the hight of the knee, and carry them along horizontally toward the next hill or cluster of vines, and bring some of the shoots from that cluster, and wind and tie them together. If they do not reach together, they cut a limb from the poplar and lengthen them out. From these horizontal vines they expect their grapes.

"It is of course a known fact that the climate of Europe, on the same parallels of northern latitude, is much milder than ours in New England. The region in which the vines I send you grew lies a little north of 45 degrees, yet snow is rare, and ice on large bodies of water seldom seen over two inches thick. We have, however, cold, piercing winds occasionally until the middle of April.

"The mode of cultivating the grape here is in some respects peculiarly adapted to a more inclement climate. They rarely allow the main trunk to grow much higher than the knee, and the vines are trained together by tying, and support themselves, or are helped temporarily by a stick in the growing season, and then they can be trimmed in November, and brought into a very small compass, and protected from the most extreme cold.

"The Tesano Refosco is the grape from which is made the choice wine of that name. It is quite peculiar to the province of Istria. A peculiarity of its manufacture is, that after the fruit is ripe, the vine on which the fruit is borne is cut off, but suffered to hang in its place until it shrinks a little before it is picked and the wine made. This is not a good table grape.

"The Muscats are of two varieties, the white and black. They are both excellent for eating out of hand, particularly the white variety, and both make a good common wine; that of the white is considered the best summer wine. They usually mix them together in planting.

"The Tesano is the grape from which the best of the common red wine of this country is made, that is universally drank by all classes. Its retail price is about twenty cents a quart. About half a pint of wine and bread, worth a kreutzer—a little less than a cent—make the daily breakfast of tens of thousands from childhood to old age. Such wine is simply the juice of the grape—a pleasant, cooling beverage, slightly acid. It is transported into the city in two huge leathern bottles, across the back of an ass, quite in the primitive way.

"It is most customary, however, for the country people to bring the fruit into the city fresh from the vines, in large conical tubs, on rustic carts; stop in front of the houses, and inquire if you wish to buy their wine; if so, then they press it out and put it into barrels, and go on. It is then used without adulteration or refining, after the first fermentation; and in this form I can readily appreciate it, with the corn and the oil, an inestimable gift from a beneficent Providence.

"The Uva Bianca, or common white grape of the country—a large, delicious grape, very good for dessert—makes a good summer wine.

"The Olovina, also a good table grape, large fruit, and from which, alone or mixed, as is common with the Tesano, a good red wine is made.

"The common method pursued by those who make a large quantity of wine is to cut their grapes in clusters and put them in large vats, with a grating about midway of the vat, so fine as not to let the stems and leaves through, but to admit the pulps and skins to fall to the bottom; the grapes are mashed, and usually turned once each day with a stick or ladle, for eight days; then the wine is drawn off and put into barrels, the bung left loose four weeks; it is then bunged tight or put into bottles. If kept in the barrel and drawn from that for use, the bung should be just drawn and a little fine sweet-oil poured in; it makes a coating on top of the wine, and keeps it from souring.

"For the best wine for family use, the grapes are not mashed, but are suffered to burst by fermentation. The wine is more delicate."

It must be kept in mind that the above rules of wine-makers, simple and easy as they may be in Istria, with the grapes of that country, may not be so applicable in America, as the information we will give in the next section. But all who desire to make wine should read both directions carefully.

SECTION XLIII.—CULTURE OF GRAPES FOR WINE—RULES FOR WINE-MAKING.

IN Section XXVI. we have given rules suited to domestic wine-making, though principally intended for other fruits than grapes. Some of the matter of this section will be interesting to those who have, or may be about to plant, vineyards. The production of pure wines for home consumption is a subject not only of much importance as a matter of economy to us as a people, but of still greater importance as it relates to matter of health with the masses, and will continue to be so as long as so many will persist in drinking something besides water. We will not attempt to discuss the subject of total abstinence, or whether wine is better than water, but when we look over the past history of man, we find him always attempting to improve or change the works of nature. He is not content with the fruits and vegetables of earth as he finds them, but is continually trying to bring about a change, or, as we express it, an improvement. A good and pure wine made from good grapes has been acknowledged for ages to be a drink that is conducive to the health and long life of the partaker. But it must not be expected that a palatable wine can be made from a hard and unpalatable grape, and a wine made from such a grape, and made palatable by mixing some foreign substance with it, is well known to be pernicious; and we have been surprised to hear men state that large quantities of pure wine had been made from our Northern Fox grape, with only the addition of sugar, when they must know that when cane sugar is added to the juice of the grape it is no longer pure wine.

A grape to make wine like the finer wines of Europe must contain sugar and tartaric acid in sufficient quantities to make it spirituous and vinous, but not strongly alcoholic; although the alcohol that is generated by the fermentation of grape sugar is not the same as that produced by the fermentation of cane sugar, and it does not produce the same effect upon the human system.

Taste is simple, but flavor is compound. Thus, by high flavor in the grape, we mean the combining of grape sugar and tartaric acid along with that peculiar vinous aroma which belongs to the grape alone; and when we drink of its juice we taste what we smell, and both sets of organs which constitute those of tasting and smelling are alike refreshed, invigorated, and delighted. The mouth is left cool and free from that acrid, biting sensation which is experienced when we partake of inferior grapes or wine.

734. **What Makes Good Wine.**—The great difficulty with our grapes has

been that they did not contain sugar enough to create alcohol in sufficient quantities to prevent the wine undergoing the acetic fermentation instead of the vinous; so that we had vinegar instead of wine—unless we added sugar, which produces rum, and grape juice instead of pure wine. Grape sugar and cane sugar are chemically different, therefore we conclude the alcohol produced by the fermentation of the two is different. Although chemists can not or do not tell us in what the difference consists, yet we know that they act differently upon the human system. A grape to make wine that is palatable and that will keep, must contain sugar enough to produce a certain amount of alcohol, but not in such quantities as we get in our imported trash, or in wines made from our poor sour grapes, with sugar added. None of the best pure light wines of Europe are ever imported, for the very reason that they will not bear a sea voyage unless they are recharged with alcohol. Those who have been accustomed to sweet wines and sweet drinks of all kinds, do not appreciate a pure wine if it is a little sour, as most of the pure wines which contain but a small per cent. of alcohol are. The acid of wines is mostly tartaric acid, and therefore comparatively healthy. The preservative qualities are alcohol and tannic acid, with a small quantity of malic acid. Sometimes, when there is not sugar enough to produce alcohol sufficient to preserve the wine—and a sour wine is not objectionable—the juice is fermented with the stems and seeds, so as to extract more of the tannic acid which is mainly derived from these. The wines made in hot climates are more alcoholic than those of colder countries; and when we get grapes here that will make wine that is sweet enough for our tastes, or our tastes become modified or cultivated so that we can appreciate a pure wine, then we may rest assured that this latitude of the United States will produce as pure and wholesome wine as any other country of the globe.

735. **Wine from Several Kinds of Grapes—Per Cent. of Alcohol.**—John L. Mottier, of Cincinnati, one of the best wine-makers in that city, has made wine from the Delaware, Herbemont, Minor, Lincoln, Union Village, and Catawba grapes, nothing but pure juice, without the addition of any foreign substance, which has been pronounced equal to any foreign wine.

The Isabella grape seldom contains sufficient sugar to produce alcohol enough to keep it. If the grapes are partly dried before they are pressed, the proportion of sugar to the juice is greater and the wine far superior, but we do not consider it a good wine-grape. The best six wine-grapes in the latitude of Cincinnati are named in the following order, and their relative quality graduated by Mr. Mottier in the order they are named:

1. Delaware.
2. Herbemont.
3. Minor's Seedling.
4. Lincoln.
5. Catawba.
6. Union Village.

With the Diana he had but little experience, but from the wine he had made from it, he was inclined to place it next to the Delaware, in the place now occupied by the Herbemont, that grape having proved to be very uncertain in its crops, as the vine is too tender for this climate.

The *Delaware* wine was the richest, and preserved the real bouquet of the grape, and it improved by age. The vintage of 1859 contained 8½ per cent. of alcohol.

Herbemont.—Very uncertain; no good wine since 1850 until 1859, when the crop was good; wine very good; quite delicate; will not bear transporting to any great distance. Alcohol, 5½ per cent.

Minor's Seedling.—Quite foxy in flavor, but a fine light-colored wine. Alcohol, 6 per cent.

Lincoln.—A dark-colored wine; resembles the finer grades of clarets, only much better than that we generally import. Alcohol, 4½ per cent.

Catawba of 1859.—Much body and strength; light amber color. Alcohol, 8 per cent.

Union Village.—A beautiful dark-colored wine; not much body or strength; will make a fine, light, summer drink. Alcohol, 5½ per cent.

These wines were all made from the grapes without the addition of sugar or any other substance. The grapes are gathered when very ripe, and all green, broken, or decayed berries picked out and thrown aside; all the apparatus that belongs to wine-making is kept in perfect order, and cleanliness is a prominent feature with all such wine-makers as Mr. Mottier and Mr. Schneicke, as it always must be in every establishment where good wine is expected. The wines of Cincinnati have already become so celebrated that they sell for a much higher price than many of our imported wines. It is charged that large quantities of poor Rhine wines have been taken to Cincinnati and put upon the lees of the Catawba and fermented with them, and then sold at a profit for Catawba wine, for that will bring $1 25 per gallon, when cheap claret can be had for 50 cents.

To show that our pure native wines are not so strongly alcoholic as many common drinks, we will give the amount of alcohol that some of these beverages contain. Of course they vary much in different specimens, but this list will show very nearly the average:

Currant wine	20 per cent.	Elderberry wine	9 per cent.
Porter	23 "	Cider	7½ "
Champagne (pure)	12 "	Ale	7 "
Gooseberry wine	12 "	The lowest Rhine wines	4½ "

736. **Rules of a French Wine-Maker.**—The following are the rules adopted by an extensive vineyard proprietor, as we find published in the *Vigneron*, a French journal devoted to the interest of grape-growers. These rules, in all essential particulars, are as applicable in America as France, and are very concise and pertinent.

"1. The grapes should not be gathered until they have arrived at complete maturity, that is to say, when they do not grow sweeter in a sensible degree. If the weather is good, they may be allowed to hang some time after this for the purpose of giving the watery parts of the fruit time to evaporate. This increases considerably the strength and sweetness of the wine. Black grapes intended for red wine should not be allowed to become too ripe; if they do, they injure the color of the wine.

"2. The vessels should be clean, and, above all, should not have contained soured wine. Care should also be taken that nothing should be allowed to fall into the must, which might cause acidity during the fermentation.

"3. White grapes should be put into a tub and pressed as quickly as possible, with the stems on. If obliged to wait before pressing the must, take out a portion at least of the stems, else the wine may taste of them. The must of weak and mucilaginous wines ought to be allowed to ferment some days with the stems, so that the tannin which they contain will assist in the precipitation of the mucilaginous matter. For good wines, the mash or residuum of the grape should never be pressed, as the last juice which comes from the press usually contains a great deal of acid and but little sugar.

"4. For sharp wines of inferior quality, and for sweet and mucilaginous wines, it is indispensable to put the must into open tubs, and leave it there several days. There forms during this time a layer or stratum of a dirty brown color, which contains a great part of the mucilage, yeast, and acid rejected by the must, and which should be taken off with care every time it forms, so as to remove all those substances which alter the taste of the wine, cause fermentation, and do a great deal of mischief.

"5. Care should be taken not to put the must into casks which are dirty, or which have been fumed with sulphur. There are some wine-makers who think that the fumes of sulphur applied to casks preserve the sweetness of wine, and purchasers are cheated in the quality of the wine by the sugar which the unfinished fermentation has left without decomposing. The following summer these wines are found to be muddy, and ferment often with great force, become sour, and are often completely spoiled. Wine should be placed in casks which have not been fumed, and no obstacle to fermentation should be opposed. There is no exception to this rule, save for those autumns which are unusually warm, and which cause fears that the fermentation will be too strong. In such a case the vessels may be fumed with sulphur.

"6. The fermentation of red wine should be treated differently from that of white. The must of black grapes may remain twenty-four hours with the stems, so that the tannin contained in them may communicate itself to the must; then the stems and seeds should be separated by means of a sieve, and the must poured into open vessels, which should be lightly covered during the fermentation. The temperature of the must, during the fermentation, should not be allowed to exceed 15 degrees of Reaumur ($65\frac{3}{4}$ degrees of Fahrenheit), in order to prevent the spirit from escaping. Every three or four hours the fermenting mass should be stirred, so as to prevent it from souring.

"7. At the end of fifteen or twenty days, when all action has ceased, and the skins have yielded their coloring matter to the must, it should be put under the press and strongly squeezed, so that all the coloring matter shall be extracted. The wine is then placed in casks not fumed, and if it is desired to increase the capacity for tannin, some of the seeds—which should be separated by a sieve from the mash—should be added to it.

"8. If the weather is cold, the openings to the cellars should be closed, so that the fermenation may meet with no interruption. Persons should never enter the cellars until they have been tested for carbonic acid by a light. The carbonic acid may be driven from the cellars by opening all the issues, by lighting a fire on the stairway, by throwing hot water into them, and by scattering freshly-slaked lime in them. During the fermentation the bung-hole should be closed with vine-leaves, or by a little bag filled with sand—the object being to prevent the air from entering at the same time that the carbonic acid is permitted to escape.

"9. Toward Christmas the clarification of the wine is about completed, and the yeast, which has become insoluble during the fermentation, is precipitated. Four weeks after the commencement of the fermentation, the casks, which should not be quite filled up at first, become completely full.

"10. The racking or drawing off from the lees at Christmas is very important and necessary. There always remains in the wine, after the first fermentation, a certain quantity of soluble leaven, and if this is not scattered, and the wine still contains undecomposed sugar, the liquid will become turbid, it will ferment again, and possibly be spoiled. In the first racking, toward the commencement of the year, care should be taken to expose the wine as much as possible to contact with the air, in which case the oxygen of the atmosphere precipitates the insoluble leaven, and the liquid clarifies completely, so that the second racking may be retarded until the end of April, there being no further fear of fermentation.

"11. The following autumn another racking should take place, after which the wine may be considered as completely made. In drawing off, great care should be taken not to mix the portion of the wine at the bottom of the cask, which is still turbid, with the clear part which is above. The turbid part should be placed in a separate vessel and submitted to a new racking before it is added to the other."

The author of these rules closes by saying: "If our wine-growers will strictly observe these prescriptions, without permitting themselves to be turned aside by local usages, they will obtain beautiful and good wines."

737. **Rules of an American Wine-Maker.**—The following rules for wine-making we find given by Prof. Wm. Hume, of Charleston, S. C. He says:

"The grapes are bruised and pressed, and the juice strained into a cask. To every gallon of this must let one pint of deodorized alcohol of 80 degrees be added, and the cask shaken to effect a mixture before the bung is put in. The effect of this mixture is to coagulate and to precipitate all the fecula contained in the must, so that at the end of twenty-four or forty-eight hours a thick sediment is formed at the bottom of the cask and the juice brightens in color. At this period I filter the whole by piercing above the sediment, and allowing the clear portion to run first, and then the sediment. An upward cloth filter or a downward sand filter is necessary, as the fecula soon covers the cloth and renders it impervious. This filtration is practiced to prevent the putrefactive fermentation from proceeding in the fecula and imparting a bad flavor. Its presence is of no possible advantage to the wine, and its absence secures us against the possibility of future fermentation. Whatever ferment there may have been in the must is now removed. All the sugar has been retained to secure sufficient sweetness, and the added deodorized alcohol has communicated no flavor or odor, and supplies the place of that which would have been formed had two pounds of sugar been added to the must. The original flavor of the grape is preserved, and with such accuracy as to enable any one to detect the kind of grape that was used to prepare the must. This quantity of alcohol, which is 10 per cent., is sufficient to preserve the must from any future change, and ranks it in strength to the weaker wines of France and Germany. The plan is so natural and simple that the wonder is that it has not long been put in practice. The nearest approach to the method is the practice common in Spain, Portugal, and Madeira, of adding brandy to their wines in order to strengthen them to suit the taste of the English and American markets. A question of economy frequently arises on the introduction of a new manufacture. I am only anxious to point out those processes to which the grapes may be subjected to produce a wholesome, agreeable, and harmless beverage, which all may enjoy, at prices far below what is now paid for dangerous compounds which may have been made in Europe, but are also largely made in these United States."

738. **Wine-Making in California.**—The old mode of making wine, still used by some of the old Californians, is to erect four posts four feet high, and forming a square about two feet and a half in size. Upon the tops of these posts the corners of a raw cow-hide are fastened, hair down, the middle of the hide bagging down in the center. This bag is nearly filled with grapes; an Indian gets in, mashes the grapes with his feet by tramping about; the juice is then dipped out, poured into a barrel, left a few weeks to ferment, and the wine is ready for use.

The native Californians have a wine which they call Angelica (pronounced *An-hel'-i-ca*), which they make by mixing one gallon of grape-brandy with three of grape-juice, fresh from the press, and adding some sugar. It is a thick, sweet, and strong drink.

Messrs. Froehling and Kohler, and probably others, have another way of making Angelica. They reduce the pure, fresh juice about one fourth or one fifth by boiling, then place it in barrels, and rack it off once or twice till it gets clear. Neither kind of Angelica ferments, the brandy and the boiling serving as preventives, though, no doubt, the Angelica made by the latter method would ferment if long exposed to the air in a warm place.

The manufacture of champagne wine was commenced on a large scale in 1858–9 by Messrs. Sainsevain Brothers, proprietors of the large vineyard of Alisal, at Los Angeles, with indications of great success. Don Pedro Sainsevain made a tour through the wine districts of France on purpose to study the business, and he brought with him an experienced and skillful wine-maker from the champagne districts. The firm have filled 50,000 bottles of the vintage of 1859, and they intended to make 80,000 bottles of the vintage of 1860. They use white wine, and mix with it about a fourth of old white wine of previous years.

The first year they lost about one bottle in five by bursting; proof that the wine will be as vigorous as the best of France. No foreign substance is mixed with the grape-juice to make it lively; all the gases in it are produced from its own substance.

The grape used in California for making wine is of Spanish stock, and was introduced by the Spanish missionaries when they established their missions, between the years 1769 and 1780. The berry, when ripe, has a dark reddish-brown color, varying to a purplish-brown in the northern part of the State. The vine is hardy and healthy, the grape is juicy and strong. An acre is expected to produce, ordinarily, 1,000 gallons of wine per year, and never less than 800, though 400 gallons is considered a good yield in Ohio, France, Germany, Spain, or Greece.

The California grape begins to ripen about the middle of September, and is gathered from that time until the end of the year, there being no frost and little rain to interfere with the harvest in the southern part of the State, which is the chief seat of the vine culture. The berry is considered to be ripe when the heart has taken a tinge resembling the darkness of the skin, when the berry is sweet and may be picked easily, and leaves no juice upon its stem, and when, on holding a bunch to the sun, the fibers running from the stem into the grape are nearly or quite invisible. The bunches are cut off with a knife, after nine o'clock in the morning, when the dew has disappeared, put into a basket and carried to the press.

Nearly all the wine and brandy made in California comes from Los Angeles County, which is, no doubt, better fitted in soil and climate for the culture of the vine than any other part of the State. It is estimated that 350,000 gallons of wine were made in the State in 1859, viz.:

	Gallons.		Gallons.
Sainsevain Brothers	73,000	—— Clements	5,000
Froehling & Kohler	60,000	Julius Weiss	4,000
B. D. Wilson	20,000	Others	146,000
William Wolfskill	12,000		
Matthew Keller	10,000	Total	330,000

It was also estimated that the amount of brandy would be 50,000 gallons.

A great many of those who make wine about Los Angeles throw away all the refuse and sediment of their presses and wine casks, thus wasting a large amount of matter, such as French brandy is made of by distillation of lees and waste. The manufacture of grape vinegar might be very much extended, where the refuse of wine is not used for making brandy.

739. **Rules for Making Domestic Wine.**—We have already, in ¶ 469 to 475, given rules for making domestic wine, yet we will give one more here under

the head of wine-making, from one who has been uniformly successful, who says:

"The currants should be fully ripe when picked; put them into a large tub, in which they may remain a day or two; then crush them with the hands, unless you have a small patent cider-press, in which they should not be pressed too much, or the stems will be bruised and impart a disagreeable taste to the juice. If the hands are used, put the crushed fruit, after the juice has been poured off, into a cloth or sack, and press out the remaining juice. Put the juice back into the tub after cleansing it, where it should remain about three days, until the first stages of fermentation are over, and remove once or twice a day the scum arising to the top. Then put the juice into a vessel—a demijohn, keg, or barrel—of a size to suit the quantity to be made, and to each quart of juice add three pounds of the best double-refined sugar, and water sufficient to make a gallon.

"Thus, ten quarts of juice and thirty pounds of sugar will give you ten gallons of wine, and so on in that proportion. Those who do not like very sweet wine can reduce the quantity of sugar to two and a half or two pounds per gallon.

"The cask must be full, and the bung or stopper left off until fermentation ceases, which will be in twelve or fifteen days. Meantime the cask must be filled up daily with water, as fermentation throws out the impure matter. When fermentation ceases, rack the wine off carefully, either from the spigot or by a siphon. Cleanse the cask thoroughly with boiling water, then return the wine, bung up tightly, and let stand for four or five months, when it will be fit to drink, and can be bottled if desired.

"All the vessels should be perfectly sweet, and the whole operation done with cleanliness. In such event, every drop of brandy or other spirituous liquors added will detract from the flavor of the wine. The fermentation of the sugar gives all the spirit required."

If any spirit is ever added to currant wine, or that made from any other fruit in a domestic way, it should be deodorized alcohol, called "pure spirit," for this is better than brandy for preserving fruits or fruit juice.

740. **The Missouri Wine-Growers' Association.**—Every neighborhood wants just such an association as that at St. Louis, called The Wine-Growers' Association, before vineyards for wine-making will be successfully cultivated. It is a business that no individual can undertake unless he is a man of very large means. At St. Louis, or vicinity, any one with means enough to plant one vine is sure of a market for his fruit at a fair price. In 1859 the Association paid from seven to ten cents a pound for Catawba grapes, and from seventy to one hundred cents a gallon for the juice. By this the poor vine-grower is encouraged, for he can immediately realize the value of his crop, instead of waiting to manufacture and ripen the wine. It was estimated that year that at least eight hundred acres were covered with vines in Missouri, within a radius of some eighty miles south and west of St. Louis, and that the fruit was nearly all gathered by the first of October quite sound,

and would yield from three to four hundred gallons of wine per acre in vineyards that have received careful and judicious management. A letter says:

"The Catawba is about the only grape grown in vineyards to any extent. Many experiments, however, are being made with other varieties by intelligent men, who are desirous of procuring a sort that will prove its superior. This, I think, will be found in the Delaware, and I look forward to the time when the Catawba, as a wine-grape, will give place to the Delaware on our hills of Missouri. It is now about fourteen years since William Glasgow, Jr., first planted a vineyard of Catawba grapes for wine-making, and it is from his example and success that a very great portion of the present favor toward vine-growing is attributable."

What a blessed thing it would be for a thousand other places if each had a William Glasgow to plant a vineyard and give the business a start, since there is scarcely a town in all the Middle States, south of latitude 43 degrees, that might not have its vineyard as well as St. Louis! Every warm, rocky hillside, now of little or no value to the owners, in Connecticut and eastern New York, might be made to yield "three or four hundred gallons of wine per acre." Every acre of Long Island that will grow scrub-oaks, if planted in vines, would yield grapes as well as the lands of Missouri or Ohio.

The native wild grape is gathered by the Germans by hundreds of bushels in Missouri, and a heavy, strong, dark wine is made therefrom, much esteemed by them, and used by the Wine-Growers' Company for making claret.

741. **The German Vine-Growers of Missouri.**—Hermannn, the seat of the German vineyards, is about eighty miles from St. Louis. One who has visited these vineyards thus pleasantly writes about them:

"For miles away, on the side of the river where we were, there was a broken view of vine-topped hills, while the lower slopes were heavy with rich woods, and the valleys green with grain. There is something about a vine-growing country peculiarly suggestive of joy and gladness. We do not easily escape the old associations of Hebrew terms—'the shoutings and singings in the vineyard.'

"Most of the settlers, said Mr. R., were very prosperous, and their wine was coming into great demand. They covered the barren hilltops far in the interior with their vineyards. They lived a good deal by themselves, and had nothing to do with the slaveholding Americans, and he believed led a happier life than any other Germans in the Western country. The town had produced last year some 80,000 gallons of wine.

"The good situations for vineyards cost from $1 to $5 an acre; those which are already improved, $15 or $20. It needs three or four years' preparation before a vineyard pays its cost. During this time the vine-grower can support himself by farming and other work. Still, to succeed, each new immigrant should have some $200 or $300 capital to build his wine-cellar and house, buy his cattle, and pay extra labor. After three or four years the vineyard will yield, on an average, from 250 to 300 gallons of wine to the acre; a very favorable site has been known to prŏduce 1,000 gallons, and 400 gallons was the lowest Mr. R.'s place had given. One man, with industry, can manage five acres. The wine is worth from $1 25 to $1 35 per gallon, so that $400 an acre is a common return.

"The worst weather in Missouri is the sultry, moist heat of July—only a few sorts of grapes can survive this—but the frosts and storms of September and October, which destroy the vines or fruit in Germany, the American vineyards entirely escape. I asked Mr. R. what effect he considered this culture of the vine to have on the habits of his countrymen. He thought that those living in this vine region were much more sober than the Germans of the cities, and that the native wine was already driving out whisky and brandy from use among the Americans. He believed the making of cheap native wine the best of all means for checking intemperance with the mass of the people, and he had already seen its effects in this direction in Missouri.

"Great care was needed in selecting sorts of vines. He had experimented with vines from California, from Spain, Italy, Hungary, and even from Palestine, and had at last settled on certain native sorts—the Norton Virginia Seedling, the Isabella, and Catawba being the best. He and others had also worked out a number of new varieties, and some they had introduced. Of these the most valued are the Clara (white), Rabee (red), Cassady (very white), Rebecca, Emily, Diana, and Concord.

"The wines made are less alcoholic than the Ohio Catawba, and resemble both burgundy and the common Rhine wine. Of the space in the State for this culture, he says, with Prof. Swallow, that 'there is more good vine land in Missouri than in all France.'"

742. **Prize for a New Wine Grape.**—Nicholas Longworth, of Cincinnati, offers a prize of $100 for the discovery of a new Fox grape, superior to the Catawba for wine. He says:

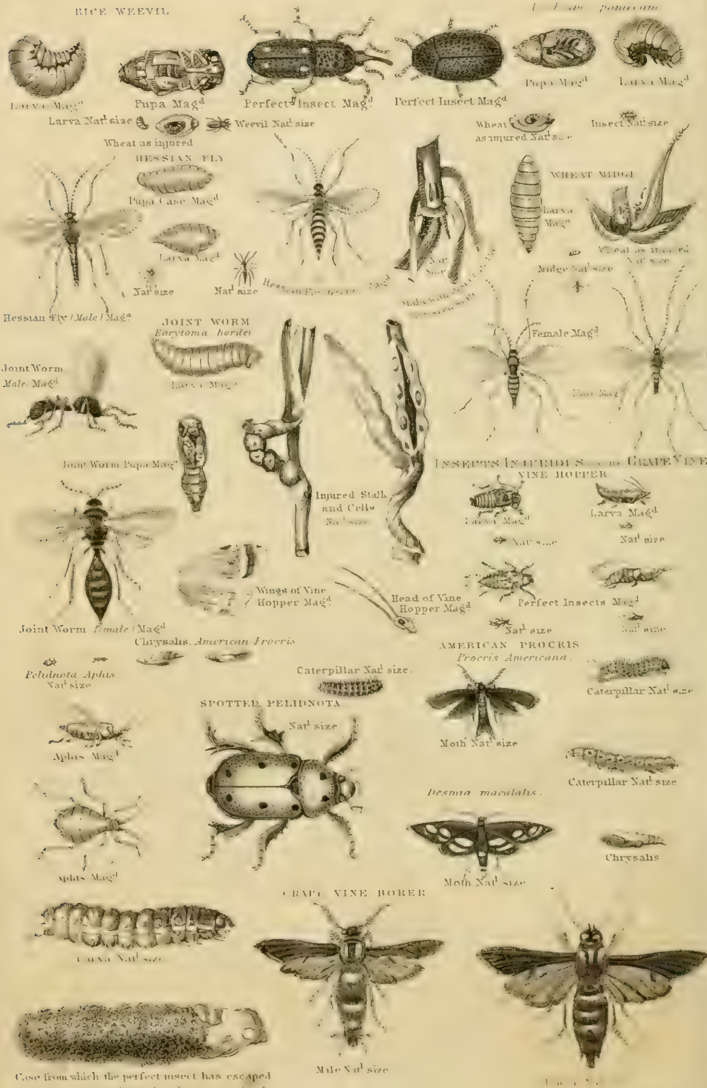
"I have for thirty years believed that a Fox grape might be found, among the thousand varieties which cover our land, that would prove superior to the Catawba for the purpose of making wine; the Catawba, it is well known, belongs to the Fox family, and superior, also, to any wine grape in Europe on account of the fine aroma and flavor. The only fault in the Catawba is its not possessing more of the aroma and flavor which belong to the Fox. The common Fox grapes have these qualities in a high degree, but they have a thick skin, a hard pulp, yield but little must, and are deficient in sugar and moisture.

"I will give a silver goblet of the value of $100, or that sum of money if preferred, for grapes that will be superior to the Catawba for the purpose of wine—the decision of the question to be left to our Vine-Growers' Association. I will also be pleased to send the person who may furnish me with the best quality of grapes a box of pure, still Catawba wine, with all charges paid."

PLATE XVII.

(Page 667.)

All that we have said of Plate XVI. we might repeat of this. It is one for careful study. It will give more information at one examination than we could convey in twenty pages of type. It is of the highest importance that every farmer should carefully study this plate, for here he will learn that in growing the staff of life, he has to contend with a host of enemies, and that he can not sit in peace under his own vine. Although we have devoted a chapter to the vineyard, we have not found room to describe these pests of the vine-groves and destroyers of grain, except in a few brief notes in Section XII., showing instead this more expensive, yet more valuable method of calling the reader's attention to this very important study. We earnestly commend this plate to his careful consideration.


RICE WEEVIL
Pupa Mag^{d}
Perfect Insect Mag^{d}
Perfect Insect Mag^{d}
Larva Nat^{l} size
Weevil Nat^{l} size
Wheat as injured
Insect Nat^{l} size
HESSIAN FLY
Pupa Case Mag^{d}
Nat^{l} size
Nat^{l} size
Hessian Fly (Male) Mag^{d}
WHEAT MIDGE
Midge Nat^{l} size
Female Mag^{d}
JOINT WORM
Eurytoma hordei
Joint Worm
Male. Mag^{d}
Injured Stalk and Cells
Joint Worm (Female) Mag^{d}
INSECTS INJURIOUS TO GRAPE VINE
VINE HOPPER
Larva Mag^{d}
Nat^{l} size
Wings of Vine Hopper Mag^{d}
Head of Vine Hopper Mag^{d}
Perfect Insects Mag^{d}
Nat^{l} size
Chrysalis. American Procris
Pelidnota Aphis
Nat^{l} size
Caterpillar Nat^{l} size.
AMERICAN PROCRIS
Procris Americana.
Caterpillar Nat^{l} size
SPOTTED PELIDNOTA
Nat^{l} size
Moth Nat^{l} size
Caterpillar Nat^{l} size
Desmia maculalis.
Chrysalis
Moth Nat^{l} size
GRAPE VINE BORER
Case from which the perfect insect has escaped
leaving the empty Chrysalis skin protruding.
Male Nat^{l} size

CHAPTER VIII.

CEREALIA.

SECTION XLIV.—WHEAT, RYE, OATS, BARLEY, MILLET, BUCKWHEAT.

UNDER the title of this chapter we shall of course talk about Indian corn (*zea mays*), but as this is the great staple crop of America, it must have a separate section. Of all the cereals, wheat should really hold the first rank, because it is the parent of great men—the chief fountain of brain food. All nations whose principal food is derived from wheat are elevated in character over those whose food is derived from coarser materials. All food produces general results according to its quality, and as wheat ranks highest, the results are most elevating to the human family. Let us look about us upon the nations of the earth, some of whom live almost exclusively upon the fat of sea animals; others upon the flesh of animals obtained in the wild woods; others depend mainly upon insects and such things as can be readily picked up. Then approaching civilization, are found people who rarely taste animal food, living upon vegetables of a low order, some of which are subject to epidemical diseases. Compare any of these nations with one whose principal food is derived from the cereals, particularly wheat, and we shall at once see the importance of any work that treats upon its cultivation.

743. **Wheat—Preparation of Soil.**—In virgin soils, such as those obtained by chopping and burning a forest, a wheat crop is often obtained without much labor in the preparation of the soil, because the seed finds the proper sustenance to nourish its young shoot, and during all stages of growth, in the decaying vegetable matter, and in the ashes of the wood burned in the clearing. So upon the prairies, a good crop of wheat is sometimes grown upon the turned sod with but little other preparation. In old land, however, it will never answer to trust to making a wheat crop without the most thorough preparation of the soil, the first and best of which is underdraining; the next, subsoil plowing; the next, a crop of clover to precede the wheat; and finally before sowing, deep plowing, and again subsoiling and complete pulverization; and lastly, a proper addition of the necessary manuring for perfect fertilization. As to subsoiling, none doubt that deep digging in the

garden is profitable, and none who try it under proper circumstances will doubt that deep plowing in the field is so.

The subsoil plow is a valuable implement on most soils, in deepening the tillage and giving sufficient room for the descent of the roots of plants, and for the ascent of moisture in dry weather.

Where no advantage has been found from the operation of subsoiling, the cause may undoubtedly be traced to the want of proper preparation of the ground by draining.

Numerous examples have been given to the public, showing the great utility of this implement. By its use the subsoil is loosened deeply, mixed with the top soil, and gradually brought to the surface, where, by changes from the air, snows, and frost, it becomes improved, and restores in some measure many fertilizing substances that have been lost on old lands.

An American subsoil plow, which is far superior to the English one, is the one generally known as "Mapes' Subsoil Lifter." Its form is tolerably well represented by a sixth part of an orange-peel, pointed at each end and rising in the middle, where a thin, flat standard is attached that connects it with the beam.

744. **Fertilization of Soil for Wheat.**—Lime and salt are the first two things to be thought of on an old farm—that is, upon a farm where it is said the land is worn out so that it will not produce wheat, but will produce clover.

If five bushels of salt are dissolved in water to a point of saturation, and that water used to slake fifteen bushels of shell lime under cover, the mass left until it effloresces, and then applied to an acre of land thoroughly pulverized, we venture to insure a good crop of wheat. We know whole farms, and many farms together, that have been raised from almost entire barrenness to a point that produces good wheat and clover crops by the use of lime alone, spread at the rate of thirty bushels of air-slaked lime to the acre on the surface after the wheat is sown.

In Virginia, between the Potomac and Rappahannock rivers, there are large tracts of sandy land that had become so poor it would not produce five bushels of rye per acre, and this land has been made to produce fifteen to twenty bushels of wheat, followed by a fine growth of clover, from an application of 200 lbs. per acre of Peruvian guano. In some cases, a bushel of plaster per acre, sown in the spring, has benefited the wheat and been of the greatest importance to the clover crop. The use of guano as a fertilizer of wheat has worked wonders in several of the wheat-growing States south of New York.

Lime, plaster, guano, bone-dust, superphosphate, ashes, salt, potash, may be all profitably used as fertilizers of the wheat crop. But after all, the great fertilizer must be clover.

A most celebrated successful wheat-grower in this country is Gen. Harman, of Genesee County. He says:

"We can take a wheat crop every third year and improve our land, if we feed off the clover with sheep. I always sow timothy in the fall and clover in the spring upon all wheat land, and so I do with all small grain. We turn under the clover sod in June with the Michigan plow, and then work it with a gang plow till first of September, and then sow Mediterranean seed by a drill machine. If the sowing is delayed till October, the fly will eat it all up, or, rather, that was the case. I have not lately seen the Hessian fly. The Golden Drop and Dayton wheat are much sown in my district. I tried spring wheat some years, but it does not pay for growing. There is a difference of two weeks in wheat maturing from seed of the same district. I have sown forty sorts of wheat in one year from all sections. The Virginia May wheat ripens earliest of any with me. All of the finest strawed wheat ripens earliest. I am not satisfied that seed from the South will ripen any earlier than the same sort grown here. I do not think there is any other crop that can be grown to so good advantage as wheat. I turn down clover for corn, first spreading manure; then I sow oats or barley, seeding again with clover and timothy, and that clover I plow under after mowing or pasturing it one year, so that I get a wheat crop every third year. I do not plant all my wheat land to corn, as I have about fifty acres in wheat and ten acres in corn. I average thirty or forty bushels of wheat per acre. I do not believe that there is a gradual decrease in the productiveness of wheat land in this State, though the crop has decreased in consequence of the midge. The use of plaster on wheat tends to prevent its early ripening, yet I think one bushel of plaster and three bushels of ashes per acre will increase the crop four bushels per acre. Plaster sown broadcast will do more good than it will put on the hills of corn."

Another successful wheat-grower in the same county, Lewes E. Heston, says: "My farm is on limestone soil. I drill two bushels of seed wheat per acre, usually after peas, and harvest twenty-five bushels an acre. The straw I feed to sheep. I think it desirable for the farmers to increase the wheat culture, as we can graze sheep on clover, and feed them straw in winter. I sow one peck of timothy with the wheat, and six quarts of clover-seed per acre in the spring. I do not cut clover for hay, but pasture it and plow it in. The soil is almost inexhaustible. I once spread the earth from the bottom of a cellar, and the wheat grew so rank that it did not head well. I cultivate 160 acres, and 50 of it in wheat. It is a common practice to sow clover and timothy upon all wheat land."

J. Jackson, of Butternut Ridge, Ohio, gives the following as his experience in getting a good crop of wheat:

"In 1857 I harvested a field of Mediterranean wheat that yielded $36\frac{2}{3}$ bushels to the acre; the ground was prepared in the following way: When it had lain in clover one year after a crop of oats, it was plowed in the fore part of June, about eight inches deep, with one strong yoke of oxen, and harrowed three times. The third week in August I gave it a light dressing of yard manure, about twenty loads to the acre; cross-plowed and sowed the last week in August. The soil is a clay loam."

It is the opinion of many that land which has ceased to be remuneratively productive in wheat would again bear good crops if the ground were put in a condition to allow the roots to penetrate deeply into it to search out and absorb new materials of stalk growth. The plant requires the mineral substances of the lower strata brought up and mixed with the vegetable substances of the surface, producing a mutual decomposition which will be facilitated by the growing of the root plants, and penetration of their roots through all its comminuted grains. The roots of a plant will penetrate a great distance in search of food and drink if the soil is made friable, hence the productiveness of rich land is due to its naturally friable condition, which allows the roots to penetrate, rather than to the richness of the surface-soil.

Of the use of plaster on wheat, one writer says:

"The fact seems to be well established that plaster has a much better effect on clover than on wheat, while superphosphate benefits turnips more than wheat. Liebig thought plaster drew ammonia from the atmosphere. To this there are two objections: first, it is very doubtful whether plaster will attract ammonia from the air; and, second, if it does, an application of plaster ought to have the same effect as a dressing of sulphate of ammonia, but it has one just the reverse. Sulphate of ammonia improves wheat much more than clover, while plaster benefits clover, and has little, if any, effect on wheat in the majority of cases."

Top-dressing wheat land with manure well decomposed, or with a rich compost, will always much more than pay the cost upon all the old farms of the Eastern States. One farmer who has practiced it says:

"On the part dressed with fine manure at the time of sowing, the seed grew a week earlier and produced double the crop of that on the land unmanured. It is true that the land that was top-dressed was higher and drier than the unmanured portion, but that only affected the start. Top-dressing gives the young plants a good start in the fall, enables them to withstand the winter better, and brings the crop rapidly forward to maturity."

Salt for wheat we consider as indispensable as it is for animals, and there are not many farmers who can be made to believe that their stock would not suffer without it; and John Johnson, "the old Scotch farmer" near Geneva, N. Y., believes just as fully that his wheat crop would suffer without salt. In the autumn of 1858 he sowed five bushels per acre upon sixty acres of wheat, and we heard him say that he believed every bushel of salt used produced an extra bushel of wheat. But this was only a small item in the account of profit. The great advantage was in hastening the ripening several days, by which he escaped the ravages of the wheat midge, while his immediate neighbors suffered great losses. It is believed to be also one of the best preventives known for rust, as it certainly stiffens the straw and gives it more vigor.

The proper application of salt is five to eight bushels per acre, sown broadcast immediately after the wheat is harrowed in.

To *prevent lodging*, one writer recommends to sow several varieties together, for the reason that some kinds bend less in storm, which helps the weaker sorts to stand up, or get up after a storm, and a larger crop is gained. But we believe that any of the fertilizers that we have recommended, particularly salt, lime, potash, and bone-dust, will so strengthen the straw that it will not lodge.

745. **Naked Fallows for Wheat.**—This old-style system of fertilizing land for wheat we hope to see give place to more enlightened views—such views as those of General Harman, detailed in a preceding paragraph. A clover fallow is altogether preferable to a naked fallow. A few farmers who follow the old beaten path of precedent, who seldom take the trouble to think, still hold to naked fallows. An advocate of them, writing to us of another's practice, says:

"He plows once in six years, and lets the land lie fallow one year, that it may have the full advantage of the summer sun and the winter frost."

The full advantage of a want of thought! Expose land to the full advantage of the summer sun! What for? What is the object? What is accomplished by the process? The land is drenched and washed upon the naked furrows, and some of the lightest portion takes its course toward the ocean's depth, never to return, except in costly guano, sea-weed, or fish manures; and it is baked and burned and dried in the sun, and its volatile properties set loose to float away upon the wings of the wind to enrich the growing crops of some farmer who never commits the great error of exposing his soil to waste in naked fallow. There is one kind of land that is benefited by exposing naked to the action of the frost—it is a stiff clay. But there is a better way to ameliorate that. It is by aerification through tile drains and the furrow of the subsoil plow. We doubt whether autumn plowing can be advocated, in itself, as a good system of farming. It is only a resort of necessity, to help along the work of spring upon land not underdrained, which remains too wet to plow without injury, long after the frost has left it loose enough. As a general rule, we do not believe that land in good tillable order was ever improved by a naked fallow. If it is to be left one year without a productive or salable crop, how much more sensible to sow the fallow-plowing with any sort of grass or grain, even buckwheat, or with turnips, but far better with clover, and let the crop grow and fall down, shading, mulching, manuring, and really improving the soil. The man who practices in the manner quoted in the text of this item is spoken of as "a man of facts." What facts has he, or his biographer, or anybody else, to prove that naked fallows are more beneficial to lands than green fallows? We should like to know.

746. **Spring Wheat.**—Spring wheat can be more profitably grown than winter wheat in some sections of the country, even where the winter variety can be grown. In some sections, winter wheat is so liable to kill out that it is an even chance whether a field sown will ever be reaped.

Mr. Walworth, a wheat-grower of St. Lawrence County, thinks spring wheat exhausts the soil less than winter wheat. This opinion is entertained by a very large portion of the farmers in that section of the State, also in all of the New England States. It is therefore of the highest importance to find out the most improved varieties, since there is a difference of full twenty-five per cent. in several kinds in common cultivation.

Ambrose Stevens, of Genesee County, N. Y., speaks highly of a new wheat from New Mexico, that ripens earlier than Canada Club wheat, and almost entirely escaped the ravages of the midge that entirely destroyed the other sort in the same field. It is a red wheat, the berry flinty and pearl-like in character; the straw medium in size and strong, the heads well bearded, and the chaff thick and tough. It was sown on the Tonawanda Creek, April 16, and kept back by the cold, wet spring, and harvested August 1, yielding from a light seeding seventeen bushels per acre. Mr. Stevens says: "Had it been more plentifully seeded, and had the wire-worm not troubled it, it would probably have produced from twenty-two to twenty-five bushels to the acre; and it makes whiter flour and bread than the Mediterranean wheat; and when grown, so as to allow of a fair comparison, has yielded better."

In the summer of 1861 a new spring wheat, supposed to be the same as the above, was grown in the east part of Westchester County, N. Y., that would average thirty bushels per acre, ripening in July a long bearded head and plump grain.

George Miller, a large farmer in Canada, sows spring wheat upon ground that grew a crop of turnips in the previous fall, for which it was well manured, and he says:

"I can get ten or fifteen bushels an acre more of spring than winter wheat. I got from seven bushels of seed, which I sowed at the rate of less than a bushel per acre, 393 bushels of grain. I put manure upon all green crops. I carry manure in winter upon turnip land, and put that in the turnip drills in June. I prefer to plow under my wheat seed."

Hon. A. B. Dickenson, of Hornby, N. Y., does not believe in spring wheat in the southern tier of counties of New York. He says:

"I have known fifty-four bushels of winter wheat per acre in this State—that can not be done with spring wheat."

Mr. Bowen, Orleans County, says:

"Some of my neighbors raised thirty-five bushels per acre of Mediterranean wheat. Some of them sow sixty acres. It is put in the last of August."

How can a farmer spend a little time more profitably than in the examination of the question of wheat-growing? First, whether by the use of proper fertilizers he can grow wheat profitably; and second, which sort, winter or spring; and third, which of the many varieties is the best.

747. **When to Sow Spring Wheat.**—As a general rule, we have found that the earlier wheat can be sown in spring the better. If the ground is well plowed, and manured if necessary in the fall, we would advise putting in the seed with a drill, or cultivator, if you have no drill, just as soon as the

frost is out of the ground, and is dry enough to work. And even if it is not very dry, the crop will probably be better than if deferred to a late period. We have seen spring wheat put in upon the prairie of Indiana and Illinois when it was so wet that a man walking over the land would sink almost over shoe at every step. This was in March. Right alongside a piece was sown in May, when the soil was in excellent condition for working. That first sown was worth double that last sown.

As a general rule, it is bad policy to work land while it is wet, but it is worse policy to wait a month after it is time to sow spring wheat for the soil to become perfectly dry. The only safe way to grow spring wheat is to prepare for it in autumn.

748. **When to Sow Winter Wheat.**—The time depends somewhat upon latitude, but the rule must be to give it a chance to grow and spread out into a complete mat of leaves, covering all the surface before the ground freezes.

It is a great object to get a good strong root to the wheat plant in the fall of the year, as it sends up more shoots, and the heads are more likely to ripen early. John Johnson says he would give a prize of $1,000 to any one who could tell him how to ripen his wheat ten days earlier than it does now. Even four days ahead of his neighbors is a great advantage, and saves him in a great measure from the ravages of the midge; and this is one of the advantages that he has gained by the use of salt, lime, high manuring, and underdraining his land. His object is to have his wheat in ear from the 5th to the 10th of June.

The *Ohio Cultivator* says:

"Between the 10th and 15th of September is the golden period for getting in wheat in Ohio and other States of the same character in soil, climate, and other agricultural condition. Peculiarities of season will vary this period; as, for instance, we have known the best of crops raised from fields sown in August, and equally good from fields sown in October. It often happens that the midsummer drouth is at its hight in the early part of September, and grain put in at that time will not readily vegetate, or if sown shallow, will never vegetate at all."

We indorse every recommendation to sow wheat early. If the ground is very dry, sow deep.

In 1861 we grew a small piece of excellent, beardless, white wheat, which was sown in the last days of August on dry soil, plowed in.

749. **How Much Seed to the Acre?**—"The quantity of seed to be sown to the acre is a matter of the very highest importance, and may be considered, first, with reference to the anticipated produce of a given quantity of land, and second, to the yield of the grain sown. There is no doubt but that by sowing thick a larger yield will be obtained than by sowing thin. East of the Alleghanies, on rich land, $2\frac{1}{2}$ bushels yield 35 bushels to the acre, when two bushels will only yield 30 bushels. In Mississippi, rich land, with $2\frac{1}{2}$ bushels sown, yield 44 bushels; with two bushels, 40 bushels. In Ve -

ezuela, 2½ bushels will yield 44 bushels. In the environs of Paris, 2½ bushels will only produce 25 bushels. In England, on the best soils, 34 bushels. In Lombardy, on irrigated lands, 25 bushels."

The following table shows the number of grains upon a square foot, yard, and acre at certain quantities:

Grains per sq. foot.	Grains per sq. yard.	Grains per acre.
4	36	174,240—1 peck
8	72	348,480—2 pecks.
12	108	522,720—3 pecks.
16	144	696,960—1 bushel.
32	288	1,393,920—2 bushels.
48	432	2,090,880—3 bushels.
64	576	2,787,840—4 bushels.
80	720	3,428,800—5 bushels.

"If any person will mark upon a board or paper a square foot of space and then divide it into four equal squares, and place a grain of wheat in the center of each square, he will have not far from one peck of seed to the acre. If he can place two in each square, he will have half a bushel, which, if every seed should vegetate, would give as many plants as the land could well mature, unless very rich. But divide the foot into sixteen squares, each of which contains nine superficial inches, and place a grain in the center of each square, and it will give one bushel of wheat to the acre. If any person will examine his winter wheat, he will find that if the plant have a vigorous growth, each seed fully stooled covers more space than it would find in the area of nine inches. Put two grains of oats to each square, and it will give two bushels to the acre. Make three to each square, and there will be three bushels of seed to the acre.

"Place three grains of clover-seed upon each square inch, and it gives less than a bushel of seed to the acre."

The experience of the farmers over the whole wheat region of the State, after nearly or quite forty years' experience, is that sixteen pounds of good clover-seed is a heavy seeding to the acre.

A Chenango County farmer says, "he knows two bushels of seed wheat per acre are better than one, which his father taught him to sow." We know that it depends upon the soil, which this writer proves by saying that his fields yield 28 to 32 bushels per acre, where formerly they only gave 15 or 20 bushels from one sowed. That may be entirely owing to the increased maturing power of the fertilizers added to the land.

The writer also says: "I raised in my garden, from one grain of seed, 3,275 grains of plump wheat in 64 heads, besides two heads given away, and 175 shrunk grains. The land was in high cultivation where ashes, lime, and salt had been spread, and the seed was planted in August." What would have been the quantity of seed per acre required, and what the yield, if the same facts had been applied to field culture?

English wheat-growers seed heavier than Americans. On good wheat land two bushels, and on poor land two and a half bushels are recommended to be sown broadcast. If wheat is carefully drilled, we believe a bushel and a peck sufficient.

All wheat for seed should be washed thoroughly before sowing, to get every foul seed out, so that nothing but wheat grains will be sown. If brine or solution of copperas or several other salts are used, the smut disease will be cured.

750. **Drilling Wheat.**—The Hon. David Crocker, of Tompkins County, N. Y., recommends farmers who drill in their wheat to set the gauge so as to drop only half the quantity of seed that they desire to plant per acre, and after going over the field once, turn the other way and put in the other half, so that the plants will stand in checks instead of rows. He puts in two bushels per acre, and thinks it produces better from being so much more evenly planted over the whole surface, so that it more than pays for the extra labor. The heads of the drilled wheat stand up side by side, and nearly every one has six rows. The stalks of broadcast wheat are unequal in hight, and some have only four rows of grain in the head.

One experiment showed a gain of nine bushels per acre in favor of drilling in the same field. An advocate of drilling wheat refers to the following Ohio farmers:

"Mr. Sickman, Mr. Napp, Mr. Molan, and J. Shook, of Wayne County; Isaac Smoker, of Ashland County; Squire Hilderbrandt, an extensive farmer of Stark County (who plants 200 acres of wheat annually); John Shaw, of Summit County; H. C. Kingsbury, of Medina County; John Fulton, of Richland County, can give the names of over a hundred farmers in Wayne, Stark, Medina, Ashland, and Richland counties, who urge all farmers, even those who only plant twelve acres of wheat, to buy drills, because at the very best they will warrant a yield of three bushels to the acre over that sown.

"The seed is all deposited three and a half inches below the surface, in rows eight inches apart, at the rate of $1\frac{1}{2}$ bushels of seed to the acre, and is not as easily picked up by the fowls and pigeons.

"Drilled wheat is not winter-killed as often as that sown broadcast, and being evenly deposited and well covered, it stands drouth better. The roots having a firmer hold in the ground, the stalks are not so liable to be thrown down; and for the same reason, in seasons when the fly makes havoc in broadcast wheat, that drilled is but slightly injured."

These facts prove that every man who annually plants ten acres of grain, Indian corn included, can well afford to keep a drilling machine, even if he did not, as he undoubtedly would, have many profitable jobs from his neighbors, who only put in three or four acres, and who would be sure to hire a drill, though they were too small farmers to buy one. As to the question of open or close drills, the following is to the point:

Dr Hartstein, Director of the Agricultural Institute at Poppelsdorf, in Prussia, has demonstrated the futility of the idea that wheat grows better in drills so wide that it can be cultivated. Four years of experiments have shown that fields planted in rows four feet apart produce but four fifths as much grain as that sown in the ordinary way; it weighs, however, about a pound and a half more to the bushel, and produces but little more than half as much straw.

751. **Seed Wheat—Selecting, Preparing, and Mixing Seed.**—Next to the thorough preparation of the soil, the most important thing to secure a good crop, is proper selection and preparation of the seed, and then just such careful planting as is effected by a good drill.

Too much care can not be given to the preparation of seed wheat; the selection of variety, the growing of it, cleansing it, and then the time and manner of sowing it, as also the kind of soil, and the preparation of that soil. All the minutiæ connected with that seed materially affects the crop. One man sorted some Chili seed carefully by hand, and sowed four kernels in a hill, and from one seed the product was nine hundred and twenty-seven. By another experiment with two seeds of Club wheat, the product was one hundred and thirty-two heads. One lot, planted in hills, required only eight pounds to the acre.

Charles Brackett, of Rochester, Fulton County, Ind., says:

"In July, 1856, I noticed some wheat in my field—one root—bearing some two thousand grains. I planted several rows of this seed in my garden, which yielded at the rate of two thousand one hundred and sixty grains to the single grain of seed. The rows were eighteen inches, two feet, and three feet apart, and at harvest the heads were as thick as they usually appear in a field of sowed wheat, and were six and seven inches long, the smallest containing seventy-two grains, and the largest heads one hundred grains. The wheat stood about six feet high, and was not lodged or injuriously affected by the heaviest winds. The soil in my garden is a sandy loam, enriched by barn-yard manure, swamp muck, and ashes; the subsoil a mixture of sand and clay, colored by iron and underlaid by coarse sandy gravel. The surface soil to the red earth is from one to two feet deep."

The following is the plan of an old farmer in selecting seed wheat:

"He took his seed wheat on the barn floor, and threw a handful at a time across the barn, and none but the very nicest, plumpest kernels would reach the farther end of the floor: all the chess and foul stuff would not go half way across."

Samuel Heirstern, of Chester County, Penn., says that he practiced mixing seed wheat sixteen years with the best results, and recommends that each farmer should every year exchange with another a part of his seed, and mix the two or more sorts together.

An Ohio wheat-grower thinks it would be to the advantage of farmers to change their seed as often as once in three years, but that seed from milder climates—as Italy, for instance—is not beneficial.

This is contrary to the opinion of some other farmers, who think seed from the South would ripen earlier and escape the midge.

An Illinois wheat-grower states that his crop increased over three bushels per acre by changing seed. The effect, in our opinion, was not produced so much by a change of seed, the variety being the same, as from the fact that the seed he obtained had been better selected.

It would require but little labor for a small quantity of seed, compared to the value it would produce, to go through the wheat-field selecting the choicest heads. The next best way is to select the very best portions of the field, and cut them especially for seed. Many years ago, when wheat-growing was more common in the Eastern States than it is now, a farmer became noted in his neighborhood for his superior variety of wheat, which he called "barrel wheat," and sold at a high price to his neighbors for seed, before they discovered that it was identical with their own; the only difference was in the manner of saving the seed, by which it got its name. And this was it: He selected the best sheaves from the field, and took them to his barn, and placed a barrel on its side upon the thrashing-floor, and took each sheaf separately and beat and whipped it over the barrel, by which the longest and best heads only were shelled, and the best grains saved for seed, and the process repeated year after year until he got a "new variety."

If seed wheat is taken from the bulk, it should not be sown before it has been screened over and over, until there is not a grain of wheat or anything else that will pass through the sieve. In this way you may make a pretty good selection of the best portion of the wheat, and exclude all small, shriveled, diseased grains, and all seeds of chess and weeds, except cockle, which defies the arts of machinists.

There is not one farmer in a hundred that does not know and acknowledge the advantage of selecting seed corn by gathering the most perfect ears in the field. If he will practice selecting wheat seed, he will probably become as fully convinced of its advantages. We believe that the wheat crop of the whole United States can be increased as much upon every farm as the Illinois farmer increased his.

752. **Pickling Seed Wheat.**—The value of pickling seed wheat, as a preventive of smut, is beyond doubt. It is a fixed fact. Water saturated with common salt is esteemed sufficient by some. In Scotland, a common pickle is urine of cattle or people, saturated with salt. Sulphate of copper, known by many as "blue-stone," used one pound to eight gallons of water, is highly recommended as a pickle for seed wheat. Sulphate of iron (copperas) is also highly recommended. In this pickle the wheat is thoroughly washed, and then dried by rolling it in dry, powdered lime, or ashes, or plaster (sulphate of lime), or dust.

In putting the wheat in the pickle, let it be scattered in very thinly, so that any imperfect grains or light seeds of any kind may float and be skimmed off, if any such have escaped the screening process, which should be very perfect, so that none but the large, sound, heavy grains should go for seed. If there still remains, from some imperfection in the operation or incompleteness of the antidote, something that induces or produces some smut in the product of the immersed seed, what may be expected of that from seed taken right out of the heap as it comes from the thrashing-machine and winnowing mill?

753. **What Becomes of Seed Wheat?—It Does Not all Grow.**—Charles Brackett writes as follows, July, 1858:

"I wish to present the following matter of vast importance in regard to the cultivation of wheat.

"I planted last autumn five rows of wheat, with spaces between different rows of three feet, two feet, and eighteen inches; this was kept clean with the hoe, and the product is as follows—Average number of stalks from each seed, 32; number of grains to the head, 72 to 100.

"Now, if we count only thirty stalks from each grain of seed, and seventy-two grains in a head, we get at the rate of over two thousand-fold, and three thousand two hundred, counting the highest yield. From the year 1845 to 1855 the average of wheat in this and parts of the adjoining counties, according to my record, was less than eight bushels to the acre, the very best being thirty-three bushels.

"Thirty stalks to the square foot will give 104,089,600 grains to the acre, which, allowing 898,560 grains to the bushel, gives nearly 116 bushels to the acre. This estimate is a correct one, based upon actual facts, and, although it looks like a wild calculation, will prove so nearly correct as to help reform our present slovenly and extravagant mode of wheat culture. The quantity of seed required to plant an acre is only a trifle over five pounds, if put in as above described.

"Suppose every seed of the bushel sown, per acre, grew and produced, as some wheat usually does, three stalks to the grain of seed, each bearing thirty grains, would not the acre produce ninety bushels? But how much does it produce? Eight bushels and less on an average.

"What becomes of seed wheat? is an interesting matter for investigation."

The following table shows an English calculation of the number of grains of wheat in a bushel, as well as several other seeds:

Wheat	660,000	Buckwheat	1,404,000
Oats	672,000	Red clover	15,000,000
Barley	550,000	White clover	40,220,000
Rye	1,230,000	Sweet vernal grass	9,250,000

There is no doubt in our mind about the injury of wheat seed by thrashing-machines, and consequently there is an incalculable number of grains of wheat which will not vegetate. Careful experiments are needed to show the per-centage of loss upon machine-thrashed seed over that thrashed by the flail, to determine whether true economy would not dictate a change, and that all grain for seed should be thrashed by hand.

According to the above calculation of 660,000 grains of wheat to the bushel, there would be 2,640,000 grains in four bushels, and if we assume all to vegetate, there would be one wheat plant to every $2\frac{3}{8}$ superficial inches, if that quantity is sown upon an acre, as there are in an acre 6,272,640 superficial inches. A good strong wheat plant, upon good soil, with plenty of room, will tiller ten-fold, and a field in proper condition should average that. Now let the advocates of thick seeding make their own estimate, and see how many plants they will have to the acre, and then go into the best field to be found, and see how many are actually growing upon each foot square, and compare the result with the number that four bushels of seed per acre should produce. In our opinion, a better preparation of the soil, a careful selection of perfect seed, and a careful planting of it, so that all would grow, and so that half a bushel would give better results than four bushels, would show the best economy.

Before, however, any certain rules can be adopted by American farmers, the actual number of seeds in a bushel must be ascertained, and very careful experiments made.

In the New York State Agricultural Society Transactions for 1849 there are some experiments reported. It is stated that wheat sown in squares one and a half inches each way, taking nearly four bushels of seed per acre, gave a product of almost seventy bushels, while one fourth the amount of seed, in squares of three inches, gave fifty-one bushels; and other trial plots, using two bushels of seed, and three fourths of a bushel, gave respectively products rating at sixty and at forty-five bushels per acre. English experiments give about the same result, pointing strongly to an even distribution of the seed over the ground on all clean soils.

Under a perfect system of tillage—giving all the ground and all the strength of the soil to the one product of wheat—no doubt the rule would hold good, that the greater the number of perfect stems and heads per acre, the greater the amount of grain produced.

Weeding wheat, where needed, compensates for the loss of space in drill culture, and we are not without experiments showing thin seeding very favorably by the side of the more liberal supply, especially in cases of early sowing on rich or very carefully cultivated soils.

These various discussions and experiments point at least to one fact for the guidance of the farmer—but one not very generally known and considered—that rich, deep, thoroughly worked soils do not need as great an amount of seed as those of a less fertile character.

A new kind of wheat, or cheat, was extensively advertised in the spring of 1861, under the name of "Japan wheat," which the issuers of the advertisement pretended will yield "three hundred bushels per acre." That story is too big. It is a big effort to "raise the wind" at the farmer's expense. It is rather more than every grain of four bushels of seed per acre would produce.

754. **When should Grain be Cut?**—A most important question for every farmer. Careful observation and some little experience during twenty years' residence in a great wheat-growing country, have convinced the writer that it is fully ten per cent. profit to cut wheat before the grain is fully ripe. Commence cutting as soon as the earliest part of the crop has passed from the milky into the dough state. There is no necessity to let it lie to cure, if

cut while the straw is still partially green. Bind it up as fast as cut, and set the bundles in stooks, two and two leaning together in dozens or twenties, or any given number, so as to give an even count. Set in this way, the most unripe grain will cure and perfect itself.

The advantages are: the grain is heavier, sweeter, and whiter; there is less loss of shattered grain; the straw, where that is an object, is so much better feed as to make it worth while to cut early, even if there were a loss on the grain, which is not the case.

For seed, the best portion of the field should be set apart and left to mature until fully ripe, and then carefully cut by hand and very carefully handled, because the very grains which should be saved for seed are the ones most easily shattered. Give these bundles a slight thrashing, and give the grain a thorough winnowing; screen out all but the most plump kernels, and sow those for your next crop, and you will succeed in improving both quality and product.

In the 2d volume of British Husbandry, pp. 136, 137, it is said that grain should be reaped, as a general rule, before the uppermost grain can be shaken out. But in this a medium course should be adopted, for although grain, if allowed to become too ripe, assumes a dull, husky hue in the sample, yet, if not ripened enough, it shrivels in the drying.

Cadet de Vaux asserts that "grain reaped eight days before the usual time, has the berries larger, fuller, and finer, and better calculated to resist the attacks of the weevil. An equal quantity of the corn thus reaped, with corn reaped at maturity, gave more bread and of a better quality. The proper time for reaping is that when the grain, on being pressed between the fingers, has a doughy appearance, like a crumb of bread just hot from the oven."

Mr. C. Howard, in the Report on Select Farms, says: "Wheat ought never to be allowed to remain uncut till it is fully ripe. By permitting it to stand until the straw has lost its succulency, gains nothing in plumpness or bulk of grain, and loses much in its color and fineness of skin, besides the risk of shelling, by high wind, or by its being cut under the influence of a burning sun.

"When fully ripened by standing in the shocks, no dry hour should be lost in getting it well secured."

Loudon observes, that "in harvesting wheat, the best farmers, both in England and on the Continent, agree that it ought to be cut before it becomes dead ripe. When this is the case the loss is considerable, both in the field and in the stack-yard; and the grain, according to Von Thaer, produces an inferior flour."

An experienced Pennsylvania farmer of our acquaintance always cuts his oats while the straw is green. This he learned to do by accident, for it was contrary to the practice of his father and all his neighbors. His hay crop was short one year, and he determined to cut his oats green; that is, a few days too soon, as he thought, losing the grain for the sake of the straw. For seed, he left a strip through the middle of the field, where the oats were best. The grain of those cut was just in the dough and milky state, and he expected they would all shrivel up. What was his surprise when he came to thrash, to find the early-cut straw yielding as much and as plump grain as that which stood till it was dead ripe, while the straw was incomparably better—in fact, the stock ate it as readily as they would timothy hay.

We have known many instances where early-cut grain was saved, while that left to ripen was lost. A farmer offered two samples of wheat, one cut on the 20th of July in a green state, when the crushed grain had the appearance of thick dough; the other, cut six days later in a ripe state, the ears drooping, and the grain firm and hard. Both samples remained in stack until the 17th of October, when the grain was thrashed, the green-cut portion was equally dry with the other, and the green-cut grain weighed twenty-eight ounces per bushel more than that which was allowed to stand till it was quite ripe, and produced a better sample of flour with one twelfth less bran.

755. **Shocking Wheat in the Harvest-Field.**—It will be often found to be good economy to take the sheaves from the bunches or dozens which have been set up two and two to cure, and put them in hand stacks, when they can not be got into a permanent stack soon enough. The following is a good rule:

Bring sufficient sheaves together, say 100, and place them in a circle or ring of about fifteen feet in diameter, with the butts to the center. Set a good-sized sheaf in the center of the inclosed space on the ground, and lay down successive sheaves, elevating the heads at first by laying them across the first sheaf, and so on around this nucleus until a circular bottom is formed sufficient to receive the quantity of sheaves brought together—always taking care to keep the heads of the sheaves duly elevated until the stack is finished. The bottom should be made of ample size, so as to permit the sheaves to have due space; otherwise the center will be too high and cause the sheaves to tumble off, or the whole to assume a leaning position. It is better, therefore, to allow full size, and then to draw the stack to an apex rather suddenly in finishing. This is more especially necessary when the sheaves are large, for it is difficult otherwise to make the top sufficiently pointed.

With the foregoing directions faithfully observed, a man with ordinary judgment may rapidly secure his wheat in the field against all ordinary weather for a month or more.

756. **Storing Grain in Stacks.**—In England, where, for a certainty, there is no lack of means to build barns, and where the climate is quite as humid at harvest-time as it is here, there is a vast amount of grain put up in stacks, and it is contended that there is less loss upon the average of grain stacked than upon grain stored in barns. In this country there is an anxiety on the part of farmers to have barn room enough to store everything, and stacking

is considered wasteful. And so it is, as stacking is generally done, but it need not be so; the fault is in the stackers, not in the system.

In England, a farmer has a permanent stack-yard, with forms, or foundations upon which to build the stacks, and these are often made of stone pillars, capped with flat stones to prevent rats and mice from climbing up and getting into the grain. Here, some brush, old rails, poles, old straw, or a few loose stones may be placed under the grain or hay, though often the stacks are built right upon the ground, and we have seen a thickness of two feet of the bottom of stacks frozen together so firmly that the hay or grain could not be got at until after a thaw, and then only in a very poor condition. The tops are frequently built equally faulty, and we once had a stack where the lazy lout who built it clung to the pole and pressed the hay down around it to such a degree that water settled in the cavity and penetrated down through the center to the very foundation. Sometimes wheat-stacks are so faultily built that the butts of bundles on the outside are higher than the tops, serving as conductors of water to the center; and such stacks by hundreds may be seen upon the prairies coated with green during a warm September rain.

With so many evidences of wastefulness in stacking, it is not to be wondered at that American farmers are prejudiced against the system, and only adopt that plan of storing grain when compelled by necessity.

Some of the remarks about stacking hay (835) will apply equally well to grain. So well satisfied are English farmers about the economy of storing grain in stacks, that we see of late, in all the English agricultural papers, advertisements of iron stack bottoms—iron frames, supported by iron pillars, about a foot and a half high.

757. **Thrashing-Machines vs. Flails.**—Because wheat *must* be *cut* by machines, farmers are apt to apply the same idea to thrashing. The rule will not always hold good. Upon the great prairie farms of the West the grain must be thrashed by machines, because the work must be done in the open air, and it is like hay-making, it must be done while the sun shines, and therefore is usually done by a ponderous machine, driven by the power of four, six, or eight horses, attended by eight to twelve men; that is, one to feed the sheaves into the thrasher, one to cut the bands and place the sheaves on the table convenient to the feeder, and one to three, according to the situation of the stack, to get the sheaves to the band cutter; and three to six men to take away the straw and grain, and one to drive, and a stout boy to do a score of nameless things. It is a heavy and always dreaded job to have the thrashing-machine about the place, and when we grew wheat on the prairie the actual cost of thrashing was 12 to 15 cents a bushel. The straw was of no value, and was often burnt after the thrashing was done to get it out of the way. We once took the trouble to pile up the straw of fifty acres, thinking it might be useful in just such a hard winter as the one that preceded the harvest, for our own or some other one's stock, but it was not needed, and the stack stood until it gradually decayed several years after-

ward. In such places, where straw and chaff are worthless for cattle feed, it will be good economy to thrash with a machine and get rid of the straw in the easiest manner, which will be by hauling it away from the machine with a horse-rake. But where straw is valuable, either for feeding or bedding, on the farm or in market, we think it good economy to thrash with a flail or with a one-horse machine in the barn from day to day, as the straw is needed. Upon this point we give the testimony of a very practical, observing farmer, one who knows whereof he speaks—the Hon. Geo. Geddes, of Fairmount, Onondaga County, N. Y., who has most successfully conducted the farm that his father managed, and which his son is now conducting without deterioration in its productiveness. He writes under date of March, 1858, as follows:

"I will give you some of the reasons that make me think that the flail is better than the large thrashing-machines for most of the farmers of central New York, except in those cases that require the grain to be thrashed soon after it is harvested. The ordinary price for thrashing wheat with the traveling machines here is five cents per bushel, the owner of the machine having with it two men and four horses that the farmer must feed. The farmer must provide six more horses, and from five to eight men—say an average of seven. All the expenses will bring up the cost of thrashing to ten cents a bushel. I have paid that for thrashing a large crop. Wheat is the only crop that makes so good a comparison for the machine, for ten cents is just a fair price for flailing out wheat in the winter, the thrasher binding up the long straw, and feeding the short straw during the day to the sheep and cattle.

"Barley can be thrashed with a flail for three cents less than by machine. Oats about the same, and yet there are cases where we use machines. Last autumn we could sell our wheat for $1 50, and our barley for $1, so we hired a machine and put the crop into market, well knowing that the prices must fall before winter. We appeared to save about half a dollar on each bushel, but there is some drawback on that calculation. Our men being thrown out of this thrashing in the winter, we have had to look up work for them that we really did not want to do, and we have lost our straw nearly, as the heavy rains of October and November could not be kept from going down through the stacks and injuring them very much. Though our sheep have had a vast amount of good hay, they are not in as good order as usual at this time of the year. Most of the farmers in Onondaga raise grain, make some butter and cheese, raise a few cattle, horses, and sheep, and intend, during the winter, to make their stock eat and trample under foot the straw of their grain, so as to get it into shape to manure their fields. The plan of thrashing it during the winter, either by flails, or stamping it out with horses on wide floors, or thrashing with a very small machine, that two horses and three or four men can handle, has this advantage, that all the short straw is fed from day to day as it is thrashed, and thus nearly every grain saved in some way. The farmer will find it to his profit to keep this winter work for his men, who he can not do without in summer, and by doing this he can raise a few sheep, calves, and a colt or two, without losing money on them.

"Thrashing is the only winter employment the farm can give hirelings, and in this view, thrashing, in fact, costs but little, for the money paid to these men during the winter enables us to employ them in the summer at reasonable prices. The result to them is constant employment; to us, economy in the first cost of thrashing.

"Machines do not thrash cleaner than flails. I have had a great deal to do with machines, but I never saw one at my barns, or my neighbors', that did not leave grain enough in the straw to make the stacks green with sprouted grain as soon as the rain wet them. A good flail-thrasher will leave but little, and that little the sheep know how to find. And oats and barley are, when thus fed to stock, worth their usual market price, and wheat more than half.

"If you find it necessary to employ machines, have a sufficient number of able-bodied men to assist. Persons inclined to diseases of the throat and lungs should not labor in the dust created by the thrashing-machine. A moistened sponge, tied over the nostrils to prevent the entrance of dust, should always be used by those most exposed."

758. **Cleaning Grain for Market.**—The practice of sending wheat to market in a very badly cleaned condition is injurious to the farmer's interest. In 1859 the Chicago Board of Trade reported that some samples of rejected wheat, returned from New York, show that the grain was an originally good, fair quality of spring wheat, and in about the condition of Chicago spring wheat generally, but so badly cleaned that it had got damp and musty and unfit for use, emitting a sour, disagreeable odor. Another lot, considered standard, that passed inspection because dry, perhaps, was found to contain oats, barley, kernels of yellow corn, and plenty of dirt. The berry of this was so good that, if it had been properly cleaned, it would have passed as extra, and fully equal to a kind known as Milwaukee Club, which sold in New York at ninety cents, while the Chicago wheat brought but eighty-two to eighty-four cents. Now, what is fact in this case is fact in others arising from the same basis, and no farmer can afford to be such a sloven. He can not put twelve per cent. of dirt in among the grain, which he must do to make up the difference in price. But great as the fault is on the part of farmers, it is greater on the part of those who buy the grain of the producers, for they pay just as much for dirty as clean wheat, or if they find a load too dirty to pass without notice, they deduct from the price paid the producer, and then mix good and bad altogether, and it sometimes happens that a farmer who has shipped wheat on his own account, that he had taken extra pains to clean, only gets the average price of the whole cargo, his honesty being taxed for the benefit of the cheater; with many the cheat *is* intentional—for dirt and cheaper grains have been purposely mixed in with wheat, because it would then bring just as much a bushel as the cleanest.

This may be the case at first, but in the end, as in the case mentioned, the loss comes back upon the farmer, and unfortunately all suffer alike, for the value of the whole crop is reduced. The only remedy that we can suggest is for every man who does honestly clean his grain to set his face against all such cheating. Refuse to sell to a man mean enough to buy dirty wheat because he can mix it with yours that is clean, and so average it; and refuse all countenance to a neighbor who purposely sells such grain.

759. **The Product of Wheat per Acre.**—What is the average product of wheat per acre in any State, or in any given district, is a question very difficult to settle, because the poor crops are never reported, nor is such a year as that of 1840 in the great wheat district tributary to Chicago, when the entire crop was blasted with rust, ever averaged upon the most fruitful years. There is generally, too, a disposition to estimate good fields too high. The following method of making an estimate of the yield per acre of a growing crop of wheat, rye, oats, or barley has been found correct in England, and seems easy of application and approximately correct:

Frame together four light sticks, measuring exactly a foot square inside, and with this in hand, walk into the field and select a spot of fair average yield, and lower the frame squarely over as many heads as it will inclose, and carefully shell out the heads thus inclosed, and weigh the grain. It is fair to presume that the product will be $\frac{1}{43560}$ part of an acre's produce. To prove it, go through the field and make ten or twenty similar calculations, and estimate by the mean of the whole number of results; it will certainly enable a farmer to make a closer calculation of what his field will produce than he can by guessing.

A year or two since a statement was published in the *American Farmer*, at Baltimore, from M. T. Goldsborough, of Ellenboro, Md., that a field of $27\frac{1}{2}$ acres, carefully measured on the farm of his father, yielded 55 bushels of wheat to the acre, and nine of the best acres each yielded $64\frac{1}{2}$ bushels. The field had been subject to a rotation of corn, wheat, and clover for a number of years, and repeatedly manured with barn-yard manure, swamp muck, woods'-mold, marl or lime, and especially with large quantities of calcareous manure obtained from the Indian oyster-shell banks. It was plowed six inches deep but once, and harrowed and rolled till the earth was loose, and not a clod could be seen. The seed was drilled in with a nine-inch drill on the 4th, 6th, and 7th of October. For $18\frac{1}{2}$ acres, only 28 bushels of seed were used of white wheat from North Carolina. The straw averaged five feet six inches in hight, but many specimens six feet four inches long were found.

S. P. Mason, of Walnut Creek, N. Y., tells us how he grew wheat at the rate of 80 bushels per acre from California seed. He inclosed with boards an exact rod of dry, gravelly soil, and spaded it 18 inches deep, mixing in well-rotted clayey turf, sifted, to the amount of a cart-load, and a peck of salt, half a bushel of ashes, and one pound of guano; then marked the bed into squares of three inches, and planted, Sept. 10, one grain in a hole two inches deep in the center of each square, using nine grains to each foot, which he thinks is too thick. It came up in eight days, and by Dec. 1 it was a perfect mat, so that the ground was hidden. On this he sifted three pecks of charcoal dust, and when the snow melted off in March, the wheat was very green. It was watered a little in a dry time, and harvested July 10, after the birds had taken a share, and dried, and the grain weighed 29¼ pounds, or nearly 80 bushels per acre.

That the yield can be increased we have abundant evidence. One writer on wheat culture says:

"If the season is backward, we may hasten the germination of our seeds by watering with a weak solution of chlorine, iodine, bromine, sulphate of iron, dilute sulphuric acid, or nitric acid, and the compounds of ammonia, and afterward, by the proper application of suitable manures, we may continue the development of all parts of the plant during the entire period of its growth, and thus increase to an amazing extent the return of seed.

"I once sowed two and a half bushels of wheat on a well-prepared acre of sandy loam ground, and it yielded me 1,600 lbs. of grain and 3,000 lbs. of straw. On an acre of rich, stiff soil, abounding in organic matter and calcareous earth, thoroughly manured, on a pea crop, the same quantity of seed yielded 2,000 lbs. of grain and 4,000 lbs. of straw.

"The grain was placed in dilute sulphate of soda for two hours before it was sown, destroying the germs of parasites."

760. **The Ability of America to Produce Wheat.**—Those who believe in the inexhaustibility of American virgin soil to produce wheat will do well to read the statistical facts in the following article prepared after the great crop of 1860 began to come into market. Our belief is, that under our present system the great wheat-producing regions of all the Atlantic States are gradually becoming less productive, and will in time be reduced to the condition of the New England States, where wheat is only grown upon favorite spots highly fertilized, and only in small plats for family use. In this view of the case, it becomes a serious question what is to be done to maintain our ability to grow wheat.

"In 1790 the United States exported 1,018,339 bushels of wheat. In 1820 the export had sunk to 25,821 bushels. In 1830 it rose to 408,910 bushels; in 1840 to 858,585 bushels; and in 1850 to 1,026,725 bushels; or only 8,386 more than sixty years previously. These extraordinary vibrations in the export are measurably governed by the shortness or abundance of the crop; but the fact has long been noticed that our wheat-producing power is rapidly declining. In fifty years this great staple of Ohio has diminished from an average yield of 30 bushels per acre to less than 15. In eleven counties of that State, which in 1850 yielded 7,531,757 bushels, there were but 4,413,207 produced in 1857, though in the interval many thousands of acres of new land must have been broken up and sowed with wheat. Virginia, Maryland, and Delaware have ceased producing largely, while in New England the diminution is almost incredible. In 1840 Rhode

Island produced 3,098 bushels, but ten years later only 49. Within the same period Connecticut fell from 87,000 bushels to 42,000; Maine, from 848,000 to 296,000; Massachusetts, from 158,000 to 31,000; New Hampshire, from 432,000 to 186,000; Vermont alone maintaining her ground by yielding 535,956 bushels in 1850 against 495,800 in 1840. In the same period Tennessee fell from 4,569,692 to 1,619,386 bushels; Kentucky, from 4,803,152 to 2,142,822; Georgia, from 1,801,830 to 1,088,534; and Alabama, from 838,520 to 294,044. The whole wheat crop of the Union in 1840 was 88,513,270 bushels, while in 1850 it had risen only to 100,585,844 bushels, an increase of only 12,072,544 in ten years, of which increase, Illinois, Indiana, and Wisconsin supplied every bushel—showing conclusively that all the old wheat regions were rapidly deteriorating. Within the same period only nine of the fifteen slave States increased their crops, while the falling off in the whole fifteen was 2,200,316 bushels.

"In New York the increase in 1850 was not ten per cent. over 1840. Many portions of the State, which once produced 25 bushels per acre, now barely average five. An English traveler in 1775 was amazed at finding that the land around Albany yielded 30 to 40 bushels per acre with the most imperfect husbandry, while in England their best managed land did not yield half so much. Yet in 1845 the average of the same Albany region had sunk to 7½ bushels per acre. In Dutchess County it had dwindled to five; in Columbia to six; in Rensselaer to eight, and in Westchester to seven. In some portions of Maryland and Virginia, wheat is no longer cultivated on land which forty years ago produced abundant crops. Ohio itself, the second on the list of wheat-producing States, is rapidly losing ground. In Canada, the yield is so steadily diminishing that within a period of seventeen years it fell from 22,981,244 to 942,835 bushels, a difference of over 22,000,000.

"It is evident that the relative production of food to increase of population is annually diminishing, notwithstanding the opening up of virgin soils to the plow. As these are opened, others are abandoned from exhaustion. Without these virgin soils to flee to, the failure of a single wheat crop would occasion a national scarcity. Actual famine can never occur in this country, because in its enormous corn crop it will ever hold a granary almost large enough to feed the world. The boast has been that we could feed the world with wheat, but nothing could be wider of the truth. In the single month of October, one year, we shipped $6,000,000 of grain and flour to England, but in the same month of the preceding year we sent none. Such are the uncertainties of dependence on a market abroad, instead of upon one at home. The crop of 1848, amounting to 126,000,000 bushels, is held to be an average one. We then had 22,000,000 inhabitants, giving within a fraction of 5½ bushels to each. But England consumes 166,000,000 bushels annually, or six bushels each. We send her wheat whenever she needs it, but we spare it only because we have corn to fall back upon. If it were not for this peculiar product of our climate, all the wheat we raise would be insufficient for our own wants. Our average export is 12,000,000 bushels. Our population doubles in about twenty years, yet the relative diminution of the wheat crop is so great that, unless our mode of agriculture is improved and the ratio per acre increased, the export will entirely cease, and we shall not produce enough for ourselves. The census of 1870 will probably establish this fact.

"The gravest reasons exist for such an opinion. The prevalent belief that this whole continent is adapted to wheat-growing is a great misapprehension. Our wild lands are not all wheat land. On the contrary, the true, reliable wheat region of this country is ascertained to be limited to ten degrees of latitude and twenty of longitude, covering about half the States. Beyond these limits wheat is certainly produced, but it is almost exclusively spring wheat, an inferior article, giving less yield and always selling lower. As New England lies outside of this belt, it can never be a wheat producing region. Vermont alone increased her product in the last decade, the increase being only 40,000 bushels, and this in the face of legislative premiums held forth to stimulate its cultivation. Formerly she was a large wheat-exporting State; now she does not export a bushel, but imports more than half of all the flour she consumes. Manufacturing has superseded agriculture, because more profitable, and the consumer having placed himself beside the producer, both are prospering. New England soil, when first broken up, produces good wheat, but exhaustive cropping has diminished its productiveness; everywhere, in fact, a virgin soil will wear out. The lands south of North Carolina have never been and never can be reliable for wheat. In only four States south of this line has there been an increase in the last ten years, and that of only 150,000 bushels. In the extreme South the diminution has been enormous. The gain in Delaware and Maryland exceeded more than half the loss of the whole fifteen slave States. Florida, Louisiana, and Texas produced in 1850 only 43,373 bushels.

"Spring wheat is raised so readily on prairie soil that it is no wonder the yield of Illinois rose from 2,335,393 bushels in 1840 to 9,414,575 in 1850, and Wisconsin in the same period from 212,116 to 4,286,231. But the popular opinion that this region is to be the permanent granary of the Union may well be doubted. It will undoubtedly go on increasing its annual product as new prairies are broken up, until the whole has been subjected to tillage; but while the new lands are yielding liberally, those first tilled will be wearing out more rapidly than those of the Atlantic States.

"On the great American plains, extending to the Rocky Mountains, perpetual barrenness rests. Thence to the Pacific is a wilderness in which Indians alone can dwell, because it produces game only. Nearly all Sonora is sterile, and most of New Mexico. No wheat can be grown over all this vast region, unless it be in a small portion of western Texas, and the narrow belt along the Pacific. Ohio is the real Western boundary of the wheat-producing region. As a general rule, in those sections where no heavy snows occur to protect the winter grain, wheat can not be raised to profit, and spring wheat must be the substitute. It is even doubted by close observers whether winter wheat has ever been grown to profit unless covered by a blanket of snow. This region embraces Ohio, the southern portions of Michigan and New York, all Pennsylvania, Maryland, and Delaware. It is proved by the census returns that the product of those States in 1850 was 48,385,000 bushels, or 2,000,000 less than half of the whole national harvest. Geological research points to the large mixture of clay in all these soils as being indispensable to continuous production of wheat, and infers its absence from the Western prairies as foreshadowing their early abandonment as wheat fields. Ohio, with a clay loam, produces 16½ bushels to each inhabitant, while Indiana, with a richer soil, produces only 8½ bushels; and Illinois, with a soil still richer, yields only seven bushels to each inhabitant.

"While the ratio per acre has thus been steadily diminishing during half a century, British agriculture has been revolutionized the other way. Here we have been skinning the land to exhaustion, and like the wasteful cotton-grower, pulling up and moving off to newer land that needed no labor for manuring. There they have swept the battle-fields of Europe for the bones of friend and foe, brought them at great expense to their own shores, and ground them up to fertilize their lands. Ships are often loaded at New York and Philadelphia with bones for English wheat fields that ought to have been retained for use at home. They have expended an untold sum for guano. More underdrains have been laid in England than in all the world besides. Fertilizers innumerable are consumed in immense quantities. Roots have become a staple of the kingdom, feeding more cattle than ever, and producing manure in abundance. Under this renovating system the land is so enriched, that in England the average yield of wheat is 36 bushels per acre, while crops of 88 bushels have been raised. Yet she has never been able to raise food enough for her vast manufacturing population. A failure in her grain crop affects the exchanges of the world. In France the same calamity produces revolution. We are now helping to feed both nations, though England is our largest customer. Yet England is the greatest exporting country known. What we sell to her in flour and grain we buy back in cloth and iron, which we should manufacture ourselves, thus building up communities of consumers on this instead of on the other side of the ocean."

761. **Wheat-Growing in Different States.**—*California* soil is undoubtedly the most productive of wheat of any in America, or the world, unless it may be Australia. The following item from a California paper shows what that State is capable of producing, and our comments will show the fertilizer used:

"The Indian Agent at Fresno, in charge of the Reservation there, reports that the yield of 300 acres of wheat on the Reservation will probably amount to 30,000 bushels; that is, 100 bushels per acre."

As we know that farming upon these reservations is generally performed by Indian laborers, there can be nothing in the mode of cultivation to account for the yield, and we are naturally led to inquire what is in the soil to afford such a production so much above anything we are accustomed to on this side of the continent. Neither can we look upon this as an isolated case, for such a production is not new in California. Now what is in the soil that makes it so productive? Nothing, probably, that is not in any good wheat soil of the Atlantic States.

Then what is the fertilizer applied to make it so productive?

That question we can readily answer. Although in this account it is not stated, yet we think, from our knowledge of what has been applied in other cases, where great yields were the result, and the only thing that we ever heard of being applied, we know that we are safe in saying that the only fertilizer applied was water—water from an irrigating ditch, led through the field and spread out in a net-work of little channels upon the surface, moistening all the roots just when most needing it. And need it they surely do where there is no rain. Here, to make irrigation advantageous as it is there, we must connect it with underdraining. And then in the same parallel of latitude, say in Virginia, North Carolina, or Georgia, upon some of the first-rate wheat soils abounding in these States, who can say that one hundred bushels of wheat per acre will not yet be grown?

Illinois wheat-growing does not appear to be very profitable by the following tables made up by these wheat-growers. "Making a calculation on thirty acres of wheat, and estimating the crop at twenty bushels per acre—a high rate, including the whole State—and setting down the cost of seed and labor at what we farmers paid last year, the result is as follows:

37½ bushels seed wheat, at $1	$37 50
Plowing thirty acres	37 50
Sowing wheat, one hand three days, at $1 per day	3 00
Harrowing twice, 6 days with teams, at $2 50	15 00
Rolling ground in spring, 2 days	5 00
Cutting with reaper, 75c. per acre	22 50
7 binders, at $1 50 per day	21 00
3 shockers, at $1 50 per day	9 00
Boarding 12 hands, 72 meals, at 20 cents per meal	14 40
Feeding 4 horses 2 days, at 25c. per head	$2 00
Hauling, two teams and hands, at $2 50 three days	15 00
2 hands stacking, 3 days, at $1 per day	6 00
Thrashing at 12 cents per bushel	72 00
Hauling from 6 to 9 miles, at 6 cents per bushel	36 00
Interest on 30 acres of land, $3 per acre	90 00
Interest on horses, wagons, harness, plow, etc.	40 00
Total	$425 00

"Some may object to my estimate of the cost of thrashing; but six cents per bushel is what was charged last fall in this section, the owner providing everything, and double that amount when he provided nothing. Thus we see that the cost of producing was very nearly seventy-one cents per bushel."

Another one says: "I consider it cost me last year to raise twenty-four acres of wheat as follows:

Plowing land at $1 50 per acre	$36 00
Seed, 1¾ bushels per acre, at $1 25 per bushel	52 50
Sowing and harrowing at 75 cents per acre	18 00
Harvesting at $1 50 per acre	36 00
Hauling and stacking at 50 cents per acre	12 00
Thrashing 660 bushels, at 5 cents per bushel	33 00
Hands, two teams, board, etc., while thrashing	$25 00
Hauling to market at 5 cents per bushel	33 00
Rent for land at $3 per acre	72 00
Total cost	$317 50
Value of wheat at 50 cents per bushel	330 00
Gain on 24 acres of wheat	$12 50

Another man says: "The first year I broke twenty acres, and here is what it cost me:

Fencing 160 rods	$160 00	Thrashing 660 bushels, at 5 cents per bushel	$33 00
Breaking at $2 50 per acre	50 00	Hands, teams, and board	12 00
Seeding, 1½ bushels per acre, at 80 cents per bushel	24 00	Hauling to market at 3 cents per bushel	19 80
Sowing and harrowing at 60 cents per acre	12 00	Total cost	$350 80
Harvesting at $1 50 per acre	30 00	Value of wheat at 80 cents per bushel.	528 00
Hauling and stacking at 50 cents per acre	10 00		

"My gain was $177 20; or $8 86 per acre."

A *Wisconsin* wheat-grower sums up the account of wheat-growing, which is very fair on paper, and very good in fact, every time it does not fail: "I take one hundred and twenty acres, and fence eighty with rails ten and a half feet long, got from the land. I used mortised posts, ten feet apart, making a fence with three rails, the lowest two and a half feet from the ground, making a strong fence against large stock; stone handily got from a ravine and bluff near, to underpin at leisure.

"The estimate is for debt and credit, as follows:

WHEAT CROP TO SUNDRIES, DR., VIZ.:

To 120 acres of raw land, at $5	$600	To harvesting and shocking 40 acres, at $1 50 ... 60	
To two months of man breaking, at $14; board $10 ... $38		To stacking 80 acres, at 40 cents ... 32	
To use of team, plow, etc., for same 75—	113	To board of harvest hands ... 20—	$152
To two months of man making and hauling rails, at $12 ... 24		To thrashing-shed and fanning-mill	50
To board $10; use of team, $10 ... 20—	44	To four months' thrashing, at $12; board $20	68
To two months making fence, at $12, $24; board $ 0	34	(Use of team, etc., largely paid for by straw thrown daily to stock.)	
To 120 bushels seed wheat, at 80 cents (present value of such wheat for St. Louis market)	96	To one month man marketing, $12; board, $5; teams ... $40—	57
To harrowing and sowing 80 acres, at 60c. (large estimate)	48	To miscellaneous and personal services	100
To harvesting and shocking 40 acres, at $1 ... $40		Total	$1,362

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By 120 acres improved farm, at $10 ... $1,200		To 2,000 bushels wheat Dr. (52 cents per bushel) ... 1,120	
To fanning mills, etc., on hand. 50—	1,250		

"The wheat used and parceled out would much more than meet the item for personal services, etc. Again, raw land in the neighborhood will not readily sell at $5, while improved would readily bring over $10. My object has been to figure so as to make the wheat cost something. The real profits of the operation were fully $1,600."

Will farmers please make a note of this fact. If you want to grow smut, sow it. If you prefer to have clean wheat, sow nothing but clean wheat for seed.

Michigan is a good wheat State in favorable seasons.

L. G. Hunt, of Kalamazoo County, Mich., gives the following as first crops upon newly-cleared woodland. On ten acres, cleared and burned off in the spring of 1855, and plowed ten inches deep, one half yielded fifty bushels per acre of Dent corn, and the other half twenty-five bushels per acre of eight-rowed yellow corn and three loads of pumpkins. Sowed to wheat in

October, the yield next harvest was eighteen bushels per acre. In 1856, another ten acres yielded fifty bushels per acre of Dent corn, with the large trees girdled and left standing, and was sowed to wheat in September among the standing corn. In 1858, another ten acres, entirely cleared, gave forty bushels per acre of Dent corn, and now has a growing crop of wheat sowed among the standing corn. He attributes his success to deep plowing, as by deep garden culture he has secured good crops of all sorts of vegetables.

Minnesota has just began to develop its capacities as a wheat-growing State.

Hon. W. C. Dodge, in a letter to the author, in 1861, speaks of an improved variety of spring wheat grown in that State. He says of this wheat, that "from two bushels sown on one and three fourth acres of land, there were produced, gathered, and thrashed eighty bushels. This would make an average yield of forty-five and five seventh bushels per acre, which is the more remarkable from the small quantity sown per acre—being only about half the usual quantity. It was grown by Messrs. Starr & Gaylord, of Lake City, Wabasha County, Minn., on prairie land, on which corn had been raised the previous season, and without manure of any kind. It was sown April 2d, and harvested July 15. Mr. Geo. Hendrickson, residing in Rose township, Ramsey County, near St. Paul, sowed the following kinds, with the results as appended:

Kind of Wheat.	Number acres. acres.	rods.	Total yield. bush.	Yield per acre. bush.
White Wheat	5	33	162 1/7	31 1-5
Scotch Club	3	47	153¼	46½
Rio Grande	17⅛		572¾	34
Canada Club	7¾		217	28

"Average yield of whole crop, 33 bushels per acre. Of barley, 11½ acres produced 500 bushels, averaging 45 per acre. Of oats, 8½ acres produced 450; average, 53 bushels per acre.

"Mr. Middaugh, of Red Wing, raised a crop of wheat of sixty bushels per acre, of sixty pounds per bushel, of sound, white, plump grains."

Ohio shows, by the assessors' returns, that 1,695,412 acres of wheat were grown in that State in 1858. The product given is 17,655,483 bushels, showing an average of 10⅗ bushels per acre. It was estimated that the crop of 1859, in Ohio, covered 2,000,000 acres, and that the average would be 15 bushels per acre.

The *Ohio Farmer* says that from 1840 to 1850, though the number of acres of wheat grown in Ohio largely increased, the number of bushels decreased 2,084,310, which it attributed to bad farming. We do not know about that. We are inclined to think the cause is owing to destruction by insects, and perhaps to the natural deterioration of the soil in its ability to produce this important portion of the staff of life. It is true that high farming might correct the loss, but while all the West is open to settlement and cultivation of new lands, high farming does not appear to pay.

Do the Ohio farmers, who perceive that the productiveness of their land for wheat is failing, always sow it upon a clover lea, which proves so advantageous everywhere else? The falling off in production is so great, that something for a substitute has already been talked of. C. W. Carpenter, of Mount Gilead, O., speaks very highly of a kind of spring barley from Italy as a substitute for wheat. He says:

"It weighs over 60 lbs. to the bushel, has no husk like the common barley, but is smooth like wheat; it must be sown very early in the spring, and I think it is as certain and will yield as well as oats—certainly better than rye or wheat; it has always been sown very thin on the ground in order to increase it as fast as possible. It makes as white, nice flour, and bread as white and light as wheat. It can not be distinguished from wheat bread, only it is sweeter and more palatable. It is certainly the best substitute for wheat known."

Pennsylvania feels the difficulty of "something wanting in the soil" to grow wheat. In a letter from Joel Sneedley, dated Fulton, Lancaster County, Pa., 8mo. 9, 1858, he says:

"I have for several years past been troubled with my wheat failing before maturity. I have been induced to believe there is something wanting in the soil to impart strength to the stalks. The system that I have pursued for several years is to manure the corn ground in the spring with clover chaff, having a clover mill; this method almost invariably produces good corn. The next spring I sow the stalk ground with oats and clover seed. The oats frequently fall before ripe; the clover is left standing the next season, and either mowed or pastured; if the latter, the ground is manured from the barn-yard, and after harvest is plowed and sowed with wheat; the wheat stubble is again slightly manured from the barn-yard, plowed and sowed again with wheat and timothy seed, with the view of setting it with grass. My fields have all been hoed over twice, and some of them three times, within twenty years. If a practical remedy for the evil referred to can be suggested, a very important benefit will be conferred on a large portion of the farmers of this section of country, who have suffered in a similar way with myself."

It has been suggested that the use of a roller would be highly beneficial in such cases as this. The rolling should be done as soon as the frost leaves the ground. In England, wheat that is not rolled is apt to fall down. It is first dragged by a large bush, and then rolled. One case is reported where the portion of a field that was rolled produced 16 bushels more wheat per acre than the portion not rolled.

As a remedy for weak straw, we should recommend lime, salt, potash, and drilling in the seed.

A farm in Chester County, Pa., of 224 acres, owned by Wellington Hickman, which for ten years has averaged 75 or 80 bushels of corn per acre, gave an average of 30 bushels of wheat upon 14 acres in 1850. The following is the statement of the entire products of the farm for that year, which has 200 acres in meadow, pasture, and plow-land:

14 acres of	wheat produced	420 bushels,	at $1 40		$588
17 "	oats "	1,200 "	33		396
16 "	corn "	960 "	60		576
Market value of grain crops on 47 acres					$1,560
42 acres of hay produced 75 tons, at $10					750

THE STOCK.

30 head of cattle, bought at an average cost of $40 per head, sold for $77 each; profit on the thirty, at $37	1,110
72 ewes, bought at $2 50, sold with their 92 lambs at $4 25; profit on a total of 164 sheep and lambs	602
Gross product of farm valued at	$4,022

Of course this statement is larger than the actual net return of the farm, as the hay, and probably much of the grain, are counted a second time in the profit on the live-stock consuming them. But that does not lessen the value of these figures for purposes of comparison. It will be perceived that the wheat averaged 30 bushels per acre, and the oats a fraction over 70 bushels; and that the money return was $42 per acre for wheat, $23 29 for oats, and $36 for corn, or an average of $33 19 per acre for the 47 acres in the three grains, which is not by any means an unpleasant result to reach.

Mr. Hickman considers that pasturing the land with sheep before breaking up for corn, and then putting a little salt in the hill, together constitute an almost sure protection against the cut-worm.

762. **Red and White Wheat.**—Though the white varieties maintain a superior price over the red, both in our own and foreign markets, yet red wheats are hardier, grow on poorer soils, and withstand the attacks of mildew, rust, and insects better than the white varieties, and are cultivated with most profit.

Red wheat that is partly transparent, hard, and flinty, is best suited to the city baker, affording what is called strong flour, that rises boldly with yeast into a spongy dough, and contains the largest proportion of gluten. For bread of the first quality the flour should be fine as well as strong, and therefore a mixture of the two conditions of wheat is best suited for making the best quality of bread.

"Generally speaking, the lightest colored white wheats indicate most opacity, and of course yield the finest flour, and red wheats are mostly flinty, and therefore yield the strongest flour; for a translucent red wheat will yield stronger flour than a translucent white wheat, and yet a red wheat never realizes so high a price in the market as white, because it contains a larger proportion of refuse in grinding."

763. **The Price of Wheat for Sixty Years.**—The following table exhibits the market price of wheat at Albany, at New Year's, from 1793 to 1854. It is from the minutes kept at the office of the Van Rensselaer Manor, at Albany, where large amounts of rent are payable in wheat, or a cash equivalent, on the 1st of January each year; and as two parties are deeply interested in the price, it is probably the most reliably correct of any record that can be obtained. There is quite a lesson in these figures—look at them:

1793	$0 75	1805	$2 00	1817	$2 25	1829	$1 75	1841	$1 00
1794	1 00	1806	1 43¾	1818	1 87½	1830	1 00	1842	1 25
1795	1 37½	1807	1 37½	1819	1 75	1831	1 25	1843	1 87½
1796	2 00	1808	1 12½	1820	1 00	1832	1 25	1844	2 00
1797	1 50	1809	1 00	1821	77	1833	1 25	1845	93¾
1798	1 25	1810	1 56¼	1822	1 12½	1834	1 00	1846	1 18¾
1799	1 18¾	1811	1 75	1823	1 25	1835	1 00	1847	1 12½
1800	1 56¼	1812	1 87½	1824	1 25	1836	1 50	1848	1 31¼
1801	1 31¼	1813	2 25	1825	1 00	1837	2 25	1849	1 18¾
1802	1 00	1814	1 87½	1826	87½	1838	1 62½	1850	1 18¾
1803	1 12½	1815	1 62½	1827	1 00	1839	1 75	1851	1 12½
1804	1 25	1816	1 75	1828	1 00	1840	1 12½	1852	1 00

1853............$1 18¾ | 1854............$1 75.

You will notice that only six times in all these years wheat has been $2 or upward per bushel, while it was seventeen times at $1 or under—once at seventy-five cents. Only once in thirty-seven years—that is, since 1817, to wit, in 1837—has it exceeded $2. The average price for the whole period is $1 38. For the last thirty years it is $1 25.

The price of wheat at Chicago since that began to be a wheat market, say about 1840, has ranged from 40 to 90 cents as a general thing. The amount stored there in 1860 was almost beyond belief, considering the young age of the country and the town as a wheat market.

764. **How Wheat is Stored and Handled.**—Without dispute the city of Buffalo is the greatest grain market upon the American continent. Here on a little creek, a convenient harbor for Indian canoes, just where Lake Erie contracts into the Niagara River, a trading post was located, out of which, in half a century, has grown a beautiful city.

From accurate information, we are assured that the quantity of grain passing through Buffalo, including that in the flour, equaled thirty millions of bushels in one year.

The lower part of the city is cut up with canals almost as much as Venice, which unite with the waters of the creek on a level with the lake. The creek is the harbor for all the lake vessels as well as for a fleet of canal boats, and is entirely too narrow for the great commerce centering here, and would be entirely inadequate but for the little tug-boats that pull the others here and there, so as to prevent an inextricable tangle.

Along the north bank of the creek are located the warehouses and counting-rooms of the flour and grain merchants, and with one exception the steam elevators, by which all the corn, wheat, oats, etc., coming over the lake in bulk is lifted from the hold of the vessel and carried to the highest loft of the warehouse, and thence spouted down to separate bins upon either floor, and thence into canal boats. One of the largest of these elevator warehouses is on the south side of the creek, having a slip under the center long enough to hold and load three canal boats at the same time, with a slip outside for a large vessel. This house can take in 57,000 bushels of grain a day, and deliver 65,000; it can store 400,000 bushels. There are eleven of these elevators on the creek, which are, altogether, capable of lifting 25,000 bushels of corn an hour; there is storage room for 1,600,000 bushels.

The charge for taking a load of grain out of a vessel and delivering it in a canal boat is half a cent a bushel—one half to the vessel and one half to the boat. If the grain is stored, the charge is one fourth cent a bushel for ten days. The grain is accurately weighed as it is taken up, and that is the measure by which it is bought and sold. And all this work is done by four men—that is, 50,000 bushels of grain are taken up and accurately measured and delivered to the boats that take it away, or lodged in store in one day by four men, independent of the shovelers who throw the corn in the vessel's hold up to the buckets that carry it up as fast as twenty men can shovel it forward. The leg, as it is termed, that contains the elevating buckets, is lowered down when the vessel comes alongside, into the hold, and when the grain is exhausted from that end, the leg is lifted up and the vessel moved forward so as to receive it in another hatchway. It is for the protection of these elevators that we see those square towers on the main houses. If the owner of corn requires it, he can at the same time it is elevated have it screened and the weight made good for one cent a bushel. Wheat is screened at the same price, but the owner takes the screenings and suffers his own loss.

When a merchant desires to sell a cargo of grain, he takes a sample in a small box under his arm and goes to the Corn Exchange, where there is a general congregation of all parties at twelve o'clock each day. If the sale is made, the buyer receives the warehouse receipt and becomes the owner of the grain specified, which he may sell again or remove at his pleasure. A fluctuation of a cent or two a bushel often changes owners of immense quantities of grain in the space of a single hour, and it is no remarkable thing to see a hundred thousand bushels started from the warehouse eastward in a single day. How could all this grain be handled without steam machinery, is the natural question of every one observing the magnitude of the grain trade at this immense granary of the world. The New York Central Railroad Company have a very large freight-house on the dock, and an elevator by which they can take the grain from the vessel's hold up into their storehouse and then spout it down and load a whole train of cars in less time than one car could be loaded by hand.

In Chicago, Buffalo, and Oswego immense quantities of grain are all measured and handled by steam-power machinery. At Oswego there are eight elevators along the creek, five of which are double; that is, two sets of elevating buckets to each building. Elevators are also to be seen at many other lake towns, and wherever they are known it would be considered the very hight of folly to persist in measuring grain in a half bushel.

765. **Preserving Wheat in Bins.**—In sections where the weevil is troublesome, it is the practice of some farmers to store wheat after it is thrashed, in the chaff. It is also stored that way on some prairie farms, where tight bins can not be provided to hold it after it is cleaned.

The practice of putting stones or bricks in the center of a bin is good to absorb moisture, and prevent mustiness. The best way to prevent weevil from destroying wheat that we have ever seen tested, is the one detailed below. Mr. H. Barber, of Juneau, Wisconsin, is also well satisfied that it is a preventive of smut. Mr. Barber says:

"When I thrash my grain I sprinkle in dry slaked lime with it in the bin. The lime absorbs the moisture, and when the grain is wanted for use, the fanning-mill blows out all the lime. This method I have practiced for years, and my seed I take from grain thus treated, and I never have any smut in my wheat."

766. **Smut—its Character Considered.**—"What is smut? and, What causes it? and, What will prevent it?" are interesting and important questions. Some years ago, these questions were pretty thoroughly discussed here and in France. M. Philippar, professor of agriculture in the *Normal School of Agriculture*, Versailles, France, asserts that smut is a parasite plant, belonging to the mushroom tribe of the genus *Uredo*. M. Poiteau declares that it is a local disease, contagious by touch, and not a parasite plant. M. Tillet and Tezzien, M. Benedict Provost and M. de Candolle, have written much upon this subject, and have all expressed their opinion that it is a parasitical plant, of the mushroom kind, and argue in the main and more essential points with M. Philippar.

"A parasitical plant is one that derives its aliment from that on which it grows. A *fungus*, a parasitical plant or production of a cellular texture, having no flowers, and deriving its nutriment from the atmosphere, and nourished also from the stalk, stem, or spawn. Its propagation is effected by means of small and very curious seeds, *spores*, or *sporules*, inclosed in skinny integuments, called *sporidia*, or spore cases. Animal and vegetable substances in a state of incipient decay are those which most generally produce fungi, but those of the simplest organization frequently locate on tissues. Of this class we may enumerate common mold as being the most familiar and best known. Of this, however, there are two types—the first of which, when examined by a microscope, is found to exhibit jointed threads, and to consist of a cellular structure, the small cavities or cells being arranged end to end, apparently independent of each other, and capable, under certain contingencies, of reproduction. The second type presents the aspect of a thread-like structure, the spores being elevated on the tops of the threads, or processes, and sometimes very thin and minute capsules or cases, which explode, and thus cause the dispersion and dissemination of the seed.

"When smut was first declared to be a plant, the labors of the microscope, applied to botany, were very imperfect; matters were declared to be *uredos*, *erinees*, and *erysiphes*, which have since been discovered to be insects' nests, or tissular maladies to which the plant was subject. Hence it followed that, as microscopic botany became better known, these pretended plants gradually disappeared from succeeding editions of botanical works. Now these plants have been generally classed in the category as the smut; and as these have been proved to be *not* of the mushroom race, so may smut also.

"A most remarkable thing is, that if the thick oil which is distilled from smut by holding it over a hot fire, is placed in contact with sound grain, nearly one third of the ear will be affected by smut." M. Poiteau maintains that this is altogether inexplicable, unless smut be contagious by touch.

After fairly considering all these scientific arguments, we are of the opinion that farmers should use all means within their power to kill the seeds of smut, so as not to grow it from seed of their own sowing.

767. **Chloroform for Insects in Wheat.**—"A commission was appointed by the French government at Algiers to inquire into the means of protecting stored grain from the ravages of insects. The commission state, as the result of their experiments, that thirty grains of chloroform, or sulphuret of carbon, put into the interior of a grain-pit, hermetically closed, are sufficient to destroy every insect in a metrical quintal (220 lbs.) of corn in four or five days. Or seventy-five grains of sulphuret of carbon, suitably divided amidst the grain, will do it in twenty-four hours. Chloroform operates rather more slowly. The sulphuret, in a still larger quantity, succeeds on grain laid in a heap and covered with an impermeable tarpaulin. A committee of the Academy of Sciences is to give its judgment upon the process."

If, as a German writer says, there are thirty thousand different insects that prey upon wheat, we think it will be a hard fight, even with all the aids of science, ever to get entirely rid of the pests; but we must keep up the fight, and use all the preventives within our reach. One farmer says: "I have learned, or think I have, that wheat sown early, say in July, in soil properly enriched, will not suffer from the fly." Then he will not need to buy chloroform.

768. **Wheat Heaving Out—a Preventive.**—The disposition to heave out during freezing and thawing that is natural to some land, can be cured as certainly as corn can be grown by the labor of plowing and hoeing. All that is needed to prevent the soil from so doing is to drain it of surplus water. Land that is saturated with water will heave out and destroy winter grain; and sometimes the difficulty is so great that timothy grass will not endure more than two winters. Thorough draining is the only remedy, and that is a certain one.

Where the land is not drained, and the danger is great in the spring of the year of losing the crop by repeated freezing and thawing, we recommend rolling the land. If you have no roller, use a stone boat, or blunt-toothed drag, or a heavy bush, or turn a large flock of sheep on the wheat, and drive them about until they have trampled the ground thoroughly. The object is to compact the earth, and press back into the soil those roots which have been hove out by the frost.

769. **Rye—its Cultivation and Yield.**—All that we have said about tne cultivation of wheat is about equally applicable to rye, which, though usually sown upon poorer soil than wheat, with much less care in its cultivation, will always pay for extra care in its extra productiveness.

The following account of a great rye crop is given by a correspondent in

July, 1861, and is commended to the attention of those who doubt about a crop of rye being profitable. We grant it is not, where the straw is of no value, and where three bushels of grain per acre is all that can be made.

'In July, 1859," says the writer, "I had land in grass that gave a very light crop. It was plowed as the grass was taken from it. About the middle of September it was again plowed, and subsoiled, manured, harrowed, and sowed with one bushel of rye to the acre. Grass seed was also put upon it. In July it was harvested, and in February thrashed by hand. The product was ninety-one bushels of rye from two acres and twelve rods of ground. The straw weighed 9,400 pounds."

As this crop was made near New York, where the straw sells as high as timothy hay, it must be set down as a profitable one.

Another farmer says: "With regard to rye, I usually sow 2¼ bushels, and find it will thrive in nearly all soils, and in many that will not grow wheat at all; the return of grain is nearly the same average as that of wheat. From an acre of land producing 25 bushels, 54 pounds to the bushel, there would be reaped 1,360 pounds of grain and 4,100 pounds of straw.

"On land of the same quality, where I only sowed 1½ bushels to the acre, my yield of grain was 1,000 pounds and 3,000 pounds of straw."

Every farmer should sow an acre of rye for pasturing sheep in autumn, when all other herbage is dried up or consumed. By this means the flock will be strong by the commencement of winter, and able to withstand the rigors of that season. In spring this rye will afford the earliest and best soiling for horses or cattle, and will furnish provender for nearly a month before clover is fit to cut.

Rye is grown as a common crop in all the New England States, and often upon land that once produced a good crop of wheat. It is about the last effort of some of the worn-out lands of Virginia, and produces from three pecks sown, three bushels of rye upon an acre. When they will no longer produce that, they are given up to old-field-pines and sedge grass—both worthless products.

Rye is generally considered an exhausting crop, but we do not know why, unless because it is a crop in a very exhaustive system, or rotation, that will exhaust any land ever cultivated, which is less fertile than the delta of the Mississippi. Such a system as corn upon a shallow-plowed field, with a little shovelful of manure in each hill, followed by oats sown upon the corn stubble, after splitting the hills with a single furrow, and this oat crop followed with rye, fertilized with nothing but the oat stubble and weeds, and that with buckwheat, and then corn again, unless, perchance, oats intervene to save the trouble of the volunteer buckwheat in the corn; and so on for a series of years, until the land can not produce more than three bushels an acre of rye, and then we hear that "rye is an unprofitable crop." So it is, and so have been all the crops ever grown by farmers who thus destroyed the natural fertility of their farms.

Although rye, as a general thing, may not be as profitable a crop as wheat, we are satisfied that it will give a handsome profit upon land that can not be profitably cultivated in wheat, if it is treated with a fair dressing of proper fertilizing substance, such as either of the following: that is, bone dust, at the rate of 10 or 15 bushels per acre; Peruvian guano, at the rate of 250 to 300 lbs.; superphosphate at the rate of 400 to 600 lbs. Wood ashes, 30 bushels per acre; or stable manure, 10 to 20 cords per acre; or a compost of muck and manure, 30 one-horse cart-loads, with 10 bushels of salt in it to an acre, all of them applied as a top dressing.

But to make this treatment profitable, clover and timothy must be sown with the rye, and that must be dressed with lime, or plaster, or both.

Remember that rye is not a profitable crop on barren soil—it is profitable on good soil, where the straw, as it does near New York, sells for as much as the grain.

770. **Oat-Growing Farmers.**—Those who usually devote their main attention to the oat crop are seldom very energetic in draining, composting, and manuring—seldom go to any great expense to improve their breeds of stock, or provide for their comfort and thrift in winter.

A dairy farmer gives the following account of his oat crop for the year: "Sowed about two and a half bushels per acre, on six acres of sandy loam, without manure, except one acre, which had about a dozen loads of horse manure after potatoes. This acre yielded about double any other acre in the field of six acres.

"The yield was two hundred and sixty bushels, or forty-three and one third bushels per acre; was the third crop of oats in succession, a kind of farming he can not commend. It requires either rest or manure to bring the land into grass, or the profitable production of any other crop, after being so exhausted."

Oats are generally sown in the most hap-hazard sort of a way of any grain in this country. One man writes: "I take less pains in preparing land for oats than any other grain; it does well as a first crop on newly-broken land, and succeeds best on a soil not much pulverized, sown after a single plowing as early in April as possible." This "less pains," is too true of many.

The old fashion in New England was to split the corn-hills with a small plow and sow the oats, about one third of the seed falling upon fresh earth, and the other upon the hard surface, or in pools of water, or on the hard roots of the corn stubble. The seed was then very lightly plowed in, and perhaps seeded with grass or clover, under a bush drag. If the butt-stalks of the corn were not cut away when the corn was harvested in autumn, they were frequently cut and burned in the spring. And such land was expected to bring a crop of grain that requires and pays for manure as well as any crop planted, except, perhaps, Indian corn. We are not even certain that that does. We are certain that oats should always be sown upon land properly dressed with some sort of fertilizer.

771. **Quantity of Seed per Acre.**—The quantity usually sown varies from

one to two bushels in this country, though a few reading farmers have learned that it is profitable to sow more seed.

In England, the common oats are sown at the rate of six bushels per acre, and potato oats at the rate of five bushels, and one man will sow sixteen acres a day.

One American farmer publishes the following statement: "I sow from three to six bushels to the acre, according to the size and weight of the grain. If potato oats are sown, two bushels will always be ample, because it has no awns, consequently there is a greater number of grains in a bushel, and it litters better than any other oat. On medium soils, three bushels will be requisite, and on upland soils six will not be found too much. If an acre produce 2,260 pounds of oats, there will be 3,000 pounds of straw. This can not always be calculated upon, because there is no grain grown that yields so variable a quantity of straw as the oat. I esteem it very highly as fodder; and it furnishes a large proportion of my winter feed for stock. Its chief enemy is the wire-worm; and if you find the ground impregnated with the larvæ, defer plowing until May, when you will bury them so deep that the oats will grow beyond their reach before they can come to the surface of the ground."

Another one says: "Two of my neighbors had each one acre of land, which they wished to seed down with oats. Their farms join, and the soil was the same, and treated alike, except that one neighbor sowed one bushel per acre, and measured up forty, of as handsome oats as I ever saw, as the result. The other man sowed three and one half bushels per acre, and measured up but thirty-three bushels. But he had a much larger quantity of straw. If these results were to decide the question, I should think that where the largest quantity of fodder was the most of an object, the heavy seeding would be the best. The man who has practiced seeding with but one bushel per acre, has received nearly the like results for the past two years."

772. **When to Sow Oats.**—As a general rule, there is no time to sow oats so good as just as soon as the frost is out of the ground, so that plowing can be done; and if the land is not naturally dry, or has been underdrained, so as to plow very early in the spring, it should be plowed in autumn with a Michigan plow, and then it can be harrowed or scarified with a cultivator, and sown and lightly dragged. And it is even better to sow without any stirring of the soil previously, if it is very soft, rather than to wait for a good time. The year 1858 will be long remembered as one of unusual wetness in the spring, and one of failure of the oat crop. Yet in every instance where the seed was put into the ground early, where it had been previously prepared, or where it had been underdrained, the crop was good, both in straw and berry.

773. **What is a good Crop of Oats, and how to Make One?**—In the spring of 1860, wishing to sow a little patch of oats for soiling, if they should be needed, we proceeded as follows. The ground was corn stubble, it was

very poor, and six hundred pounds of superphosphate to the acre had been applied in 1859. It was plowed in autumn, and the next spring plowed with a subsoil plow for the first operation. This new way of plowing attracted some attention. Several passers-by stopped to look and wonder, and say pooh! After it was thus plowed, it received a moderate dressing, composed of barn-yard manure, well-rotted, and hair and spent lime, from a glue manufactory, and old ditch bank stuff, to which was added a small per-centage of the bulk of printer's roller composition, and about half a bushel of salt to a cord of manure. It was piled in autumn, and overhauled once in the winter, and was not quite ripe when a portion of it was spread upon the oat ground. After harrowing over the manure, to break the lumps and mix it with the soil, three bushels of common black seed oats were sown, and plowed in with a light plow, and again harrowed. This was done about the 12th of April, and the season that followed was not favorable to the growth of a good crop. It was altogether too dry for the growing plants to get the full benefit of the manure; but they grew, and I soon began to hear that "Robinson had the best piece of oats in the country." I wished every day that the piece had been large, as well as the oats. My neighbors were sadly disappointed, I believe, that the crop did not all fall down before it was ripe, but it did not—only part of it, and that part on the new ground—which is, say, two fifths of the whole. The great drouth in July prevented the plants from attaining as large a growth as they would, particularly on the old ground, which is part of a piece noted for its poverty. A fair average sample of the growth upon the corn-ground was about four feet and a half long. Some of it on the new ground was full a foot higher, and stout in proportion. Intending to feed the crop without thrashing, I had it cut pretty green—that is, as soon as the most of the straw turned yellow. That on the corn-stubble part, and a portion of the other, was bound up into very stout, double-banded sheaves, which were, when well seasoned, quite as heavy as I cared to pitch upon a pretty warm day. Of these sheaves we had thirty-one dozen, and the heads were well loaded with plump grain. The other part was mowed and cured like hay, and pitched up into cocks, so that we could estimate it as though in sheaves, which we did, at full twenty dozen. I think it was more, as it made two snug ox-cart loads, and more than two thirds the bulk and apparent weight of the other part. Then there was, besides, a little load of rakings. I will call the whole fifty-two dozen stout, double-banded sheaves, which, if thrashed, would surely yield a bushel to the dozen; and this was a good crop for land badly worn, upon a piece of ground of the following dimensions: the first side is 156 feet; the one opposite to it, 183 feet; the two other sides, one is 168 feet, and the opposite 213 feet. The superficial contents, if I calculate rightly, are 32,290 feet. The superficial contents of an acre are 43,560 feet. Three fourths of an acre, then, contains 32,670 feet, so that my patch of oats lack 380 superficial feet of surface of being three quarters of an acre; and farmers hereabouts consider it a pretty good crop, and I want to know whether it is not worth their while to think about manuring oat-ground? And also think about plowing oat-ground with a good-sized subsoil plow? And what do they think about plowing in the seed? And finally, what about sowing four bushels of seed per acre, and harvesting sixteen-fold? It is a matter which will do to think about.

We have no doubt that it would be quite as profitable to apply manure to oats as to corn, and that there is no need of exhausting land with oats.

To prove this, and also to prove that my neighbors were in error when they told me that wheat could not be profitably grown in this neighborhood, and not at all upon oat stubble, and that grass and clover seed "would not catch," I plowed under the oat stubble, running a subsoil plow in every furrow, and gave the land another light dressing of manure, which was afterward plowed in with a light plow, and sowed wheat at the rate of three bushels per acre upon the rough furrows and harrowed in once, and then timothy seed, a peck per acre—sowed and harrowed again. After the wheat was up it was dressed with plaster, two bushels per acre.

The winter being almost without snow, and freezing and thawing frequently, was hard upon wheat, and there were consequently several sage remarks in the spring, such as, "There, I told you it was no use to sow wheat upon oat stubble." No matter; the grass looked well, and that was the main object, and so four quarts per acre of clover seed were put on, and afterward salt, at the rate of about five bushels per acre, was sown, and after a while the wheat began to recover from its hard winter, and if anybody had a better yield or finer plump berries I am glad, and should like to see it. At any rate, I am convinced that wheat will grow upon oat stubble, and good timothy and clover afterward.

Still, we would not recommend sowing wheat or any other grain upon oat stubble, because we prefer to sow grass and clover, and let that grow one year at least, so as to have a good sod to serve as manure.

774. **Rusty Oats.**—This is, compared with rusty wheat, a new disease, only appearing to any extent in this country within five years. Some oat crops, badly rusted in Illinois, have been reported as producing death when the straw was fed to horses. An article in the *Southern Homestead*, when the disease first appeared in the Southwest, attributed it to insects. It says:

"From microscopic examinations, we are satisfied that the cause of all this destruction of the oat crop is a living worm, too small to be plainly seen with the naked eye. A single blade or leaf of the oat sometimes contains hundreds of them. They lie incased in the tissues of the leaf or blade, where they have been generated, beneath the epidermis or thin pellicle over the exterior portion of the blade, and as they progress in development, the skin of the leaf is raised into curious puffy blisters. The growth of the worm subsequently ruptures these, and it escapes to feed on the plant. When first released from their covering, they are of a beautiful clear red color, almost transparent, but soon begin to change color and form, getting more opaque and dark in appearance, until in the course of transformation they become a black bug, with legs and wings, when they attack the head or grain of the oats.

"Under the microscope, the dust which remains on the leaf closely resembles that on the wings of butterflies.

"How this innumerable army of infinitesimal worms originated is yet a mystery. It is a singular fact, however, that wherever the greatest quantity of rain has fallen, there the oat crop has fared the worst."

As cause and effect are often mistaken or misplaced, it may be so in this case, and that the rust was occasioned upon the oats by the excess of rain and heat, which does produce it on wheat, and the worms followed this diseased condition as they do disease and decay of many other vegetables.

775. **Barley Cultivation.**—The cultivation of barley in the State of New York has largely increased since the destruction by the midge has been so great as to deter many farmers from all attempts to grow wheat.

There are two principal kinds of barley as of wheat—winter and spring. Winter barley is sown from the middle to the last of September, at the rate of two and a half bushels per acre, and will be ready for harvest the last of June.

A correspondent in Kentucky recommends sowing winter barley after oats, rather than after winter wheat, for the reason that the land, having been plowed in the spring, can be got into better condition than that which has not been plowed for twelve months.

Our severe winters do not injure barley when it is sown on dry uplands, but it does not succeed on low, moist land. It should be sown early—though many do not sow it till after they have got in their wheat, and it requires the same culture, and when sown on good soil, properly prepared, the yield is large.

There is one thing that farmers must remember about barley—they can not grow it on poor land. Of the cultivation of spring barley, a New York farmer, who has grown it some years, says:

"In the cultivation of barley I usually sow $2\frac{3}{4}$ bushels to the acre of the two-rowed *Hordeum distichon*, which yields 38 bushels of 36 pounds to the bushel, or 1,368 pounds of barley and 2,800 pounds of straw.

"The best season for sowing it is about the 1st of May, after some crop on which manure has been applied; it will not succeed a summer fallow well; the best soil is a rich, finely pulverized loam. I usually sow it broadcast, but it will do better in drills. On a contiguous piece of land I sowed $1\frac{1}{4}$ bushels to the acre, and found great disadvantage in it; the season was dry, and few or no offsets were thrown off. The yield was 1,000 pounds of barley and 2,000 pounds of straw."

A Georgia paper recommends barley as a valuable crop for that section. The writer says:

"This is one of the most valuable winter crops that can be grown at the South. We give some directions for its proper culture. In the first place, the ground must be rich, and any time after the first to the middle of October is the right time for seeding. New land that has been heavily cow-penned yields enormously. The ground should be well broken up, and about one bushel and a half sowed to the acre, and then plowed or harrowed in. In its early growth pigs may run upon it, and after a while calves, but never full-grown stock. For horses and cattle, the grain is almost equal to corn, and there is no green food that sustains a working animal like it."

In *harvesting barley*, it is important to cut it at the right stage, when neither too green nor too ripe. If rather green, the grain shrinks, and is of light weight; if fully ripe, it shells easily, is liable to become discolored, and the straw is of less value. When the head begins to assume a reddish cast and drops down upon the straw, the proper period of harvesting has arrived, and as after this the grain ripens rapidly, it should at once be cared for. It may be mown or cradled, or cut with a reaper; if the straw is long, it should be bound; if short, with proper forks it can be pitched at once from the swath and stored without binding. Barley should be secured as soon as thoroughly dry, which will be soon in favorable weather.

The *varieties of barley* are numerous; Scotland has some thirty, though really there are but three decidedly distinct sorts; that is, the two-rowed, four-rowed, and six-rowed. The two-rowed barley grows the largest grains, that is, 80 to the drachm; the four-rowed, 111 grains to the drachm, and the six-rowed, 93 grains to the drachm.

The *use of barley* is principally for making malt for beer, but there is a good deal used for making pearl barley. It is not much used in this country for bread, though it makes a very sweet, nutritious food, and very palatable when eaten as hot cakes.

The *profits of a barley crop*, reported for premium in 1859 by Hiram Mills, Lewis County, N. Y., were $31 98 upon two acres. The soil was clay loam, with hard clay subsoil. The crop in 1858 was peas on sward. The land was plowed in autumn, and in the spring 26 loads of cow-stable manure spread and plowed on the 9th of May, and sowed next day with two and a half bushels per acre of two-rowed barley, put in with a cultivator and then harrowed. It was cut with a scythe Aug. 11th, and spread like hay to cure, and raked with a horse-rake, and hauled from winrows to the barn, and thrashed with a machine Dec. 12th. The yield was a fraction over 122 bushels, of 48 lbs. per bushel, on two acres. The whole field of 13 acres yielded over 50¾ bushels an acre. It sold at 75 cents a bushel, and the straw was valued at only $5 an acre. In some localities it would be valued much higher, so that upon the basis of this crop, growing barley must be accounted profitable.

A Niagara County, N. Y., farmer offers the following opinion upon the subject of growing barley. He says: "The question of the profit of barley-growing to the farmer is one which ought to be discussed. We are getting doubtful of the propriety of using our best soils for so uncertain a crop, while corn, oats, and hay are much surer, and hence, on an average, more remunerative. Besides, the use, or rather abuse, which is made of the greatest part of this product, is one that conscientious, thinking men can scarcely reflect upon with pleasure. Barley requires, with us in Niagara County, the best land we have, prepared in the most thorough manner; and it must then have a very favorable season, free from drouth or excessive wet, to insure a fair yield. Barley straw, well cured, and not over-ripe, is freely eaten by cattle and sheep. It is worth more for fodder than wheat straw, and our cattle, while the grass is yet green, will fill themselves from the straw-stack every night when they return to the yard. By elevating the straw-carrier above the lower sieves of the separator, when thrashing, the bearded chaff is thrown into the manure yard, thus escaping its presence in the straw to the injury of sheep by getting in the wool while eating. This straw is sometimes of small value, because over-ripe and weatherbeaten, or because carelessly saved and stacked. In our opinion, it is worth better treatment."

776. **Buckwheat as a Farm Crop.**—A large portion of the farmers of the New England States, and also some of the other Northern and Western States, raise a little buckwheat for family use, but few depend upon it as a farm crop, because most of them believe it to be an exhausting one, and some think a few successive sowings would utterly ruin land. Now, *Is buckwheat an exhausting crop?* We find this question answered according to our notion of facts in the *Country Gentleman:*

"I will give an authentic case, coming under my own notice, at variance with the usually received theory. A neighbor of mine has grown buckwheat on the same field (and a poor field naturally, at that,) for twenty-six consecutive years, with a fair average return, no other manure having been carried on the field than the buckwheat haulm, which was regularly returned. Said neighbor having died, the farm came into the possession of others, who raised in the succeeding years good crops of corn, wheat, and clover."

Buckwheat straw, if cut before frost, makes very good fodder, everybody's opinion to the contrary notwithstanding, and we have no doubt makes good manure for any other crop. It certainly does when turned in green.

As to the profitableness of growing buckwheat we are well satisfied, provided it is not, as is too apt to be the case, turned off upon the very poorest old field on the farm. With a fair chance it will average twenty-five or thirty bushels an acre.

The premium crop of New York, 1859, was thirty-five and a half bushels, grown upon sandy loam in good order, where a crop of rye badly winter-killed had been plowed in July 1st, and the buckwheat sowed July 6th, one bushel per acre. It was harvested the last week in September, and sold at $62\frac{1}{2}$ cents a bushel. The whole field from which the acre was measured, yielded two hundred and two bushels upon six acres. The profit upon the crop was counted $11 an acre.

We look upon buckwheat as the most important crop for planting late in the season of any of the substitutes for wheat. It may be sown as late as the first of July. Some farmers consider half a bushel of seed upon good land sufficient, as the more it branches the more productive will be the crop. It is a profitable crop, as it is easily cut and thrashed upon the field, or it may be stacked and kept till winter. The grain, besides its use for human food, is one of the most valuable for poultry-feeding, and to fit up a horse quickly with a sleek coat there is no grain equal to buckwheat. For ordinary stock-feed it is not as valuable as corn, barley, rye, wheat, or peas. Indian corn should never be planted upon buckweat stubble. We are not aware that it injures any other crop.

777. **Millet as a Farm Crop.**—Very few farmers sow millet as a farm crop, and many never saw it grow. Of late years, one variety has been a good deal extended at the West, under the name of Hungarian grass. That kind grows with a branching head, heavily loaded with round seed, somewhat larger than turnip seed. Another sort grows a spike-head, eight or ten inches long, and is generally called Syrian millet, and the other is called German millet. The botanical name of the millet mostly grown here is *Panicum Sorghum*, and it is largely cultivated in some parts of the world as a bread crop. It grows well in sandy soil, and is really a productive crop, and one of the great advantages of it is that it may be sown after corn, oats, potatoes, and spring wheat have been provided for. From the 1st to the 15th of June is the right time to put it in, and it is fit to cut after grass and grain. For poultry feed, millet is excellent, and well worth growing for that purpose. It is estimated that a fair crop of millet will produce three or four tuns per acre of straw, and twenty bushels or more of seed. If the crop is sown for the purpose of making seed, it is recommended by those who have grown it most, to sow twelve quarts, and if the crop is intended to be cut for hay, sow half a bushel of seed per acre. When allowed to stand till all the seed is well ripened, thirty bushels an acre is a common yield.

For a soiling crop millet is very good, particularly the large sort, which grows in rich soil with large succulent stalks, and makes as good feed and as large a burden as sowed corn, and often succeeds when that fails. It requires no more skill, and hardly as much labor to grow a crop of millet as a crop of oats.

In districts where it is most grown in Europe, the opinion prevails that millet yields more food for man and beast than any other cultivated grain. Cut for hay, the crop is large and of excellent quality, and, it is said, imparts a vigor and elasticity to working cattle that is acquired from no other food. Stock, too, are very fond of millet hay.

Writers in Europe, treating upon the cultivation of millet generally, concur in the following statements:

If allowed to ripen its seed, it is an excellent grain for animals, possessing as much nutriment as Indian corn, but not its fattening property. In Europe it is often ground, and where people are accustomed to its use, they are fond of millet bread. A rich, light soil is best, and it should be deep and finely prepared as for wheat. If grown for hay, from thirty to forty quarts of seed should be sown to the acre. It should be cut while the seed is in the milky state, and as soon as it is well wilted it should be put up and cured in cocks, as recommended for clover hay. If the weather is fine, it will be sufficiently made in three or four days, when the cocks should be turned and opened a few hours before it is hauled in. When sown for the grain, from sixteen to twenty quarts of seed are required to the acre, and if put in with a good seed drill, the crop of seed would be much improved.

No attempt should ever be made to secure both seed and hay from tne same field. Plant one field for seed and one for hay. A good crop will yield five tuns of hay per acre.

For seed, the upper parts of the heads must be ripe before they are cut.

There is one advantage in growing millet that ought to commend it to all farmers—it flourishes well in the driest seasons.

Farmers who once commence the cultivation of millet seldom, if ever, abandon it.

778. **Grain Farms and Stock Farms.**—In closing this section upon the cereals (except maize), we could write a long paragraph upon the subject of uniting stock and grain farms, but will only copy from the New York State Agricultural Society's Transactions the following suggestive and instructive paragraphs from Hon. George Geddes' Survey of Onondaga County:

"In that part of the county best adapted to the cultivation of grain, our farmers generally intend to keep stock enough to manufacture their hay, cornstalks, and straw into manure. The teams to do their work they must have, and the cows to make their own butter, and perhaps a small surplus to sell; the rest is generally made up with sheep, as the most convenient stock to handle, with the least labor. They calculate that eight merino sheep can be kept as well as a cow on the farm, and with far less labor. A good ewe should yield four and a half pounds of wool, worth 45 cts. per lb., which for the eight gives \$16 20; and the eight should raise six lambs, worth in the fall \$2 each, which with the wool gives \$28 20. We could not profitably devote all our lands that are good for grain to raising sheep, but we can connect them in proper numbers with grain-raising to advantage—we think to more advantage than any other farm-stock.

"To show the advantage of raising some stock in connection with grain, we have only to take Camillus, which is a grain-raising town, and we find that only $1\frac{15}{100}$ acres are devoted to pasture, $\frac{54}{100}$ to meadow, for each head of neat cattle, of horses, and of eight sheep. This gives for pasture and meadow $1\frac{69}{100}$ acres for each head. From this it is evident that the straw and cornstalks of Camillus winter about half the stock, and the pasture from grain-fields nearly half pastures them. If we carry this calculation fully out, the comparison between the purely grazing and mixed agriculture would be still more striking. The town of Camillus has a large number of horses engaged in other business than farming, the canal running through the town, and being near Syracuse, a considerable part of the hay is sold

PLATE XVIII.

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This picture, although not so showy and attractive to sight at first view, is one of the most valuable in the series. It should be most carefully studied by every farmer. He must learn to readily tell his worst enemies from his best friends. Here both are placed before him. He should examine them so carefully, that he can afterward distinguish them as easily as he can tell his own horse from that of his neighbor. The three classes of insects illustrated upon the upper part of this plate are the most destructive of all the pests of the farm; yet the farmer who has not informed himself all about insects, would be just as likely to destroy those represented upon the lower part of the plate as he would the others. Yet they are his best friends; without them he could not exist. The destructors of fruit and grain and trees would prevent man from growing a sufficiency of food, if it were not for the "insects beneficial to the agriculturist."

The little that we have found room for under the head of Entomology (Sec. XII.) will only serve to whet the appetite to study the habits and character of all insects in works devoted to the subject. Without such works, much may be learned from this plate. Many, perhaps for the first time, will be made to understand that each of those pretty little spotted bugs which frequently swarm about the garden, which we have been merely taught the common name of, and because it is pretty, have called "the lady bird," is one of man's co-laborers in the garden; and so are several others which he will see pictured in its company. We entreat you to study the picture of every one of these insects most carefully.


Entrance.
PLUM WEEVIL or CURCULIO
Plum cut open showing insect at work
same Mag^d
Weevil Flying
Depositing Egg.
Natural size.
Codling Moth, Caterpillar and Chrysalis
Codling Moths
Larva
Weevil or Curculio feigning death
Nat^l size
Weevil Mag^d
CODLING MOTH
PEACH TREE BORER
Peach Worm at work
Male
Chrysalis in Cocoon
INSECTS BENEFICIAL to the AGRICULTURIST.
Caterpillar at work
Nat^l size
ICHNEUMON FLY
Fly
Syrphus
LADY BIRD
Nat^l size
Perfect Insect Mag^d
Pupa
Aphis Mag^d
Mag^d
Larva
Cocoon
Nat^l size
of Lace Wing Fly
Harpalus
Larva devouring Aphis
Reduvius Novenarius
Nat^l size
Lace Wing Fly
REAR HORSE
Mantis
Ichneumon Fly Nat^l size

there. In the grazing town of Fabius, a small fraction over three acres of pasture and meadow is required for each head of stock, or eight sheep."

Assuming this as the proper ratio, he makes a three-year-old steer cost, for use of land $36, care $18, total $54, or about five cents per day up to that age, and the expense is far from being over-estimated where stock-raising is carried on upon expensive land unconnected with grain-growing.

SECTION XLV.—INDIAN CORN—ITS HISTORY.

INDIAN CORN (maize) is the poor man's crop. It is often grown by the new settler in the little opening he makes in the woods, amid stumps and fallen trees, by the aid of his hoe alone. Without Indian corn, this country could never have been settled and brought into such rapid cultivation. It is to America the most important crop that is grown. It enters into the food of all classes of people, either as bread or meat, so that it may be said that it is as much a universal food crop with us as rice is in India. It is more important than rice, for it produces a higher order of civilization.

Indian corn takes its name from the American aborigines, among whom it was found growing before they knew the use or value of iron implements of husbandry. It has ever been a favorite food with them, and since we call them Indians, it is very proper to call this Indian corn.

At first, Europeans who came to this country, as well as those who come now, were and are prejudiced against the use of this grain as food, not even relishing it when cooked in the milky state, of which Americans, like the Indians, have become so universally fond. The Irish, too, in time of famine, when supplies of this great American breadstuff were sent them, considered it but little better than starvation to be obliged to sustain life upon food only fit for fatting pigs. The same people had just as strong prejudices at first against potatoes, now called Irish potatoes, because so many of that nation live upon them almost as exclusively as some Americans do upon Indian corn. The value of the corn crop to America is beyond calculation. The two next greatest—wheat and hay—do not equal it, while beside corn, the boasted cotton crop is a mere fraction. Its importance is universal; no product common to all the States has ever been so extensively cultivated. So important was it considered by the native inhabitants of America, that in Peru the palace gardens of the Incas were ornamented with maize, with all the grains, spikes, stalks, and leaves, in gold and silver, representing the growth in its exact and natural shape; a proof no less of the wealth of the

Incas than of their veneration for this important grain. In further proof of the American origin of this plant, it may be stated that it is still found growing in a wild state from the Rocky Mountains to the humid forests of Paraguay, where, instead of having each grain naked—as is always the case after long cultivation—it is completely covered with glumes or husks. Columbus found the natives of Hispaniola cultivating it in extensive fields, and those of other places first visited by him were also in possession of it. The first Englishmen by whom it was cultivated were those who settled in Virginia in 1607.

In all the wars against the Indians, the hardest blows given them were in the destruction of their cornfields. The burning of a wigwam town was misery to women and children, but destruction of the cornfields impoverished the entire tribe. The former could be quickly rebuilt, but the latter could not be replaced till next year. The Indians had not many varieties of corn, and its cultivation was a necessity with them, and the task was imposed on the women, who planted, gathered, roasted, pounded, and cooked the corn. The plowshare occasionally turns up, on the site of some forgotten wigwam, the rude stones which crushed the ripened grain. The whites quickly recognized the value of corn as food for man and beast, improved its culture, multiplied its varieties, and by the invention of machines for shelling it rapidly and grinding it cheaply, raised it to the position of a staple so important, that if the whole wheat crop of this country were suddenly annihilated, the corn crop alone would supply us plenteously with food. While Louisiana and Florida produce but 1,500 bushels annually of wheat, they give 14,000,000 bushels of corn; and slaves consume no more wheat than did the aborigines. Corn is their sole food, and if the corn crop could be annihilated, slavery would perish of starvation. It is cheap corn as well as high-priced cotton that keeps slavery alive.

Corn hybridizes with great facility, so that varieties are constantly increasing, yet a rich reward is ready for whoever may propagate a new variety far surpassing any of the sorts now cultivated. It may be said of sorts now in use, that one is grown in one district of country because it was first introduced there, the growers being satisfied without looking farther. Another, because great crops have been secured from it in a different section, where the soil had been found especially congenial. A third, because the grain was large and the cob small. A fourth, because the stalk grew very tall and yielded much fodder; while a fifth was preferred for peculiarities directly opposite. It happens, fortunately, that all varieties are good for man and beast, and that where cultivation is well managed, good crops and certain profits are the result.

Chemistry applied to detecting the peculiarities of Indian corn shows a great difference in varieties. "A grain cut in half, and immersed in a solution of hydrosulphate of ammonia, will have the chit changed to a dark olive color, thus proving the presence of salts of iron. The exact limits of starch and dextrine contained in the grain are indicated by the tincture of iodine striking an intense blue with the starch, and a deep port-wine red with dextrine; so that this test, by producing a rich violet, indicated the presence of both starch and dextrine. If the oil be extracted from the transparent horny part of corn by alcohol or ether, the tincture of iodine will show the presence of starch in that part of the grain associated with the gluten. By these means one can readily cause any grain to define the extent and precise limit of each of its ingredients, and enable the naked eye to form a pretty correct estimate of their relative proportions in different seeds. The relative proportions of the phosphates in grain depend on the appropriating power of each species or variety. Thus, an ear of corn being selected containing two different kinds, the Tuscarora and the sweet corn, and these seeds being split in two and immersed in the same solution, soon gave evidence of more than double the amount of phosphates in the sweet corn than in the other variety. The result was extraordinary, because the grains came from the same ear and grew side by side, yet they had obtained unequal quantities of phosphates from the same sap, drawn from the same soil." Thus, a crop of sweet corn will appropriate twice as much of the phosphates as the other variety, and will consequently sooner exhaust the soil of them. Hence ground bones are the specific manure for sweet corn. This variety has recently come into extensive use for table consumption, and is annually increasing. Its numerous growers should freely make use of ground bones as its most valuable fertilizer. Its origin is unknown, but it appears to have been used by the aborigines of New England previous to the settlement of the country by the Pilgrims. In addition to a large proportion of the phosphates, it contains a great quantity of sugar and gum, with but little starch. Its short and slender stalks take up a less proportion of the saline matters of the soil.

Chemistry proves that corn possesses peculiar value as food for young animals, because it contains more of the phosphates than the smaller grains. Farmers know, without knowing the cause, that the bones of young animals are greatly strengthened by being fed on corn, and they may learn from chemistry not only how to raise corn, but how to use it. Chemistry indicates the relative power possessed by each kind of grain of appropriating the phosphates contained in the soil, and consequently its wants. As oats and buckwheat contain the least proportion, they may be raised on soil not fully supplied with phosphates.

Tuscarora corn is one of the varieties which does not contain oil. Rice corn contains the most, pop corn ranks next, Canada corn third, and brown corn next. There is a curious difference observable in the mode of distribution of the oily and glutinous parts of corn, the Southern variety always having it on the sides of the elongated seed, while the starch projects quite through the grain to its summit, and by its contraction in drying produces the peculiar pit or depression in what is known as "gourd-seed corn." The Baden corn, which contains a very fine white oil, is still more remarkable for this arrangement.

The uses of oil in corn are manifold. It is obviously to protect the grain from rapid decomposition in the soil, during long-continued wet, and to retain a portion of food until needed by the young plant, as the oil is uniformly the last portion of the grain taken up. It serves to keep meal from souring readily, and kiln-dried flint-corn meal will keep sweet for years, when put up properly, while the Tuscarora meal will sour in a short time. The oil imparts a decided taste to the meal, not pleasant to persons accustomed to use varieties containing no oil.

There is from six to twelve per cent. of oil in corn, that of Southern growth containing less than Northern. When hulled by means of potash lye, the oil next to the epidermis of the grain is converted into soap, and the epidermis is detached. The caustic alkali also liberates ammonia from the mucilage around the germ. When corn is used for the manufacture of whisky, the oil is saved during the fermentation, as it separates and rises to the surface. It is held that 100 bushels of grain will yield 15 gallons of oil valuable for illuminating purposes.

The colors of Indian corn depend on that of the epidermis, or hull, and of the oil—the latter, when yellow, showing its color through a transparent epidermis. In white varieties the oil is transparent and colorless, and the epidermis being also free from color, the meal is white. The Golden Sioux, a twelve-rowed variety, is colored by the oil. Red and blue owe their lively hues to the colors of the epidermis, and not to the oil. On inspecting very thin slices of corn under the microscope, the epidermis is found to be made up of hexagonal cells much larger than those of the glutinous and oily parts of the grain. The starch globules are distinctly seen in the starchy part; a drop of diluted tincture of iodine brings out their forms and character with beautiful distinctness. The phosphates are probably in the state of a fine powder, while the ammonia is in combination with the organic matters, forming a kind of *ammid* in the mucilage around the germ.

Corn contains all the elements required for the perfect development and support of the bodies of animals. The ingredients make it a highly nutritious grain. The gluten and mucilage contain nitrogen, an element essential to the formation of fibrous tissue, muscle, nervous matter, and brain. The oil is nearly-formed fat, easily convertible into animal oils by a slight change of composition. Starch also is convertible into fat, and into the carbonaceous substances of the body, and during its slow combustion in the circulation gives out a portion of the heat of animal bodies, while in its altered state it goes to form a part of the living frame. From the phosphates are derived the substance of bone, as well as the saline matters of brains, nerves, and other solid and fluid parts of the body. The salts of iron contained in the food of animals go to the blood, and constitute an essential portion of it, enabling it, by successive changes of its degree of oxydation during the circulation through lungs, arteries, and veins, to transport oxygen to every part of the body.

"Chemistry has proved that 'flesh is grass,' that vegetable and animal fiber are identical, as are vegetable and animal albumen. Plants are therefore organs of reduction, animals mere organs of combustion. Vegetables produce neutral nitrogenized matters, fat matters, sugar, starch, and gum; decompose carbonic acid gas, absorb heat and electricity, and are an apparatus of reduction. Animals consume what the vegetables produce, at the same time producing carbonic acid gas, giving out heat and electricity, being an apparatus of combustion."

Corn is unquestionably the prime national staple, and in every season of deficient crops of other grains, the corn crop has proved a granary upon which the nation could live, and the yield is annually increasing. In 1840 it was 377,000,000 bushels; in 1850 it was over 590,000,000; and in 1860, 900,000,000. In 1840 our whole export of corn and its manufactures amounted to only $800,000. In 1847 the famine in Ireland swelled the amount to $18,696,000, since which the export has never fallen below $2,000,000, while in 1855 it rose to $8,198,693, and in 1859 to $6,187,446. When a bushel of wheat is worth 95 cents, one of corn is worth 77, nutriment alone considered; yet when corn has stood at $1 per bushel, wheat has stood at $2 50. Thus, in buying wheat, we obtain, for any given amount of money, a little less than half the nutriment we obtain when buying corn

		1840.	1850.
Product of the slave States	bushels,	252,443,802	348,992,282
Product of the free States	"	124,988,072	242,618,650
		377,431,874	591,610,932

Thus the increased production in the free States was about 75 per cent., while in the slave States it was only about 39 per cent. The greatest corn-producing State in 1840 was Tennessee, whose crop was 44,986,188 bushels. In 1850 it was but a little over 52,000,000. In the same period Indiana and Illinois had risen from 50,790,098 to 110,611,347 bushels. Iowa had increased her yield nearly 500 per cent., Wisconsin as much, while New Jersey, Ohio, Vermont, and Maine nearly doubled theirs. In Michigan the increase was more than double. In only two of the slave States, Missouri and Arkansas, was the production double. Virginia made poorer relative progress than any other State. These figures show that the great corn empire of this country is to be in the West. Nearly one sixth of the Ohio crop has heretofore been converted into whisky.

In 1855, Ohio had 2,205,282 acres in corn, producing 87,587,434 bushels, an average of 39.7 per acre. In 1859, the quantity in corn was 2,431,312 acres, producing 68,730,846 bushels, an average of only 28 3. For ten years the average yield has been steadily declining; in two only, within that period, rising above the yield of 1850. It then stood at 36.8 per acre, and in 1859 at 28.3.

Indian corn is the great American staple—the grand necessity of all American agriculture. The grand success in its production is, first of all, in the preparation of the seed, and the soil in which it is to be planted.

779. **Corn Crops, North and South. How to Grow them Better.**—We think that in all the Southern States, excluding the alluvions, the average per acre will not equal ten bushels of Indian corn, while a crop of forty bushels upon some of the richest river bottoms is considered a first-rate one. It is not surprising that the yield is so light. Look how it is planted. In all of the slave States the little one-horse shovel plow is in common use. This plow is made of a piece of thin iron like a pointed shovel, say nine inches across, which is fastened to the standard under the beam, and the whole is so light that I have often seen a negro girl of fourteen or fifteen years old, mount her mule and take her plow on her shoulder or on before her, to ride to the field. With this tool the ground is scratched over, and corn planted and tended by the same implement. As the subsoil is hard, the roots only spread through the loose earth on the surface, and the after-plowing serves to tear them to pieces. In lower Virginia it is common to throw the land all into beds about a foot high, five feet apart, and grow stalks one in a place, from two to four feet apart. The crop is ten to twenty bushels. One of the largest planters on the Roanoke cultivates about 3,000 acres in corn. His land is very rich, and subject to overflows. He does not manure, and burns his stalks and cobs to get rid of them. The yield averages perhaps thirty bushels. In the same vicinity the Messrs. Burgwin have brought the average yield of their land from seven bushels to thirty, principally by deep plowing. They plant rows five feet apart, and stalks one to two feet apart. Uplands in that vicinity, plowed by one horse and the little shovel plows, produce five to ten bushels to the acre. It is planted about the 20th of April, 4 by 4½ feet, one stalk in a hill without manure. On the bottom lands of James River the average yield may be about twenty-five bushels. On the Sandy Point estate, where the land is a true loam, and plowed with a three-mule team, and planted about 25th of April, five and a half feet between rows and one and one fourth feet between stalks, the yield is thirty-five bushels average. The seed is covered with a harrow, and the crop tended with a double shovel plow. The annual crop is five hundred acres. Gen. Peyton, above Richmond, took an old plantation and renovated it by deep plowing. He runs what is called a coulter, which is a small subsoil plow, to mark the rows, and then again on each side after the corn is up. This lets the roots down sixteen inches to search for food and moisture. Edmund Ruffin has renovated an old farm on the Pamunky, east of Richmond, by the use of marl and deep plowing. He plants 4 by 5 feet, two stalks in a hill, and 5 by 2 feet, one stalk in a place. Mr. Ruffin is the champion of calcareous manures, and has caused many thousand acres of worn-out land to be restored. The Sandy Point estate has been limed three times, with first, fifty bushels; second, thirty-five bushels; third, thirty-five bushels; and cultivated on the five-field system—that is, corn, wheat, clover, wheat, fallow. The annual wheat crop is 1,000 acres, which has been increased from an average of three bushels to seventeen. There are 2,700 acres of plow land in one field. The corn crop is from 15,000 to 20,000 bushels a year,

about two thirds of which is sold. This place will be long remembered by "the army of the Potomac," as the one where the Chickahominy was crossed on the pontoon bridge.

On Edisto Island, and upon the coast of South Carolina generally, the cultivation is all done by hoes. A negro will tend six to eight acres in cotton, corn, and potatoes. Upon the plantation of Mr. Townsend, who has made efforts to induce people to use the plow, the task of his hands is five acres of cotton, three acres of corn, and one of potatoes to each field-hand. In all the Southern States there are thousands of acres planted every year, upon ground scratched over by the little shovel plow, that does not yield ten bushels per acre, and much of it not five bushels. The great fault everywhere is shallow plowing, and that is the reason why corn crops do not average better in all the corn-growing States.

A negro scratches two or three marks about two inches deep in the loose earth, in the place where the rows are to be, leaving the "middles" to be "broke out" after the corn is planted and has come up. This is a part of the cultivation, or "tending the crop," on land never manured.

At the West, the average yield of all the acres planted is not thirty bushels, although crops of ten acres each have averaged over one hundred and fifty bushels per acre, and crops of one hundred bushels are not unusual. Upon rich prairie soil, forty to sixty bushels per acre is accounted first-rate, and fully satisfactory to the producer.

Most of the cornfields of all the Eastern States might be made to double their yield by the use of a plow that would reverse the surface ten inches, bringing the lower five to the top and leaving them loose and friable, and then following in the same furrows with a subsoil lifter that would loosen the compact earth eight or ten inches deeper, to say nothing of the advantage of turning under a strong grass or clover sod to decay and furnish food for the grain at the very time when it was most needed. All this is independent of manures, either from the farm-yard, or sea-side, or muck-beds, or city streets, or from Peru, or any of the manufactories of artificial fertilizers, and is within the reach of all corn-planters who may be unable to procure the other means of fertility and increase of the crop, without some of which it is now useless to attempt to grow Indian corn in New York or New England.

In the old States, Indian corn can not be profitably grown upon land that has not been underdrained or subsoil plowed, and that is not plowed at least eight inches deep for each crop, and most thoroughly pulverized before the seed is put into the ground. As a general rule, half the labor of after-culture will be saved by proper preparation of the ground before planting. One of the best implements ever used for marking out the rows is a subsoil lifter. We have seen an ordinary plow coulter, eighteen inches long, fastened to a beam with handles, used for marking the rows with decided benefit, as it made a temporary drain for the young plants, which every farmer knows can not bear any excess of water, even for a few hours, in a hot sun, without serious injury to all the after-growth of stalk and production of grain.

Upon the virgin soil of the prairies, or upon the bottom-lands of some of the Western rivers, men will not, of course, follow these directions, because they can get a large acreable yield with less labor, and some of them have been so long in the practice of raising corn in the slovenly, careless manner they do, that it is as useless to ask them to improve as it is to ask a New England farmer who never grew 40 bushels of corn upon an acre to believe that his neighbor has grown 80. Both East and West, and North and South, the mass will still work on in the old way, notwithstanding all the facts spread before them, yet we will hope that one or two may be induced to resolve upon improvement after reading this article.

Upon the rich prairie soil of Indiana and Illinois, corn has been grown on contract for five cents a bushel. The late Hon. Henry L. Ellsworth had 3,000 acres one year grown by persons who contracted with Mr. E. to plow, plant, till, and grow the crop ready for harvesting for $3 an acre, and the yield gave sixty bushels per acre.

One of the premium corn crops of Connecticut was grown by Nathan Hart, Jr., of West Cornwall. The soil was a rich, friable loam, which had been in grass for the last forty years, and had received no manure except the droppings of the cattle. It had probably been pretty well manured in this way. "Twenty-four ox-cart loads of manure from the barn cellar were applied; the land was plowed seven inches deep on the 9th and 11th of May. The seed was of the Dutton variety. It was soaked for thirty-six hours in a warm solution of saltpeter, and rolled in plaster and planted May 23, four kernels in a hill, the hills from two to two and a half feet apart in the row, and the rows three feet apart. It was hoed three times by hand after the horse-hoe at intervals of eight days, commencing June 13.

"The crop was cut up by the roots during the week commencing Sept. 17, and husked the first week in November. The yield was 98 bushels, one peck, six quarts per acre.

Estimated value of crop, including stalks and pumpkins	$103 43
Cost of raising	37 50
Balance profit of the crop	$65 93

"Wm. H. Putnam, of Brooklyn, grew another prize crop. The soil was a wet, black loam, with a heavy, compact subsoil, which had been three years in grass, with no manure. Sixteen full loads of stable manure from under cover were plowed in, and ten loads of compost, made from fermented stable and hog manure, well mixed with rather poor summer-made yard manure, were put in the hill. His land was plowed eight inches deep, and corn dropped upon the manure, in furrows three feet apart, and the corn two and a half feet apart in the furrow, and plaster upon the corn; six quarts of seed to the acre of the Rhode Island premium variety, planted May 27. Cultivated and hoed twice, and thinned to four stalks in the hill, and when ripe, cut up by the roots and stacked. The yield was $95\frac{1}{2}$ bushels to the acre.

Value of the whole crop	$96 40
Cost of cultivation	26 50
Balance of profit	$69 90

"James A. Bill, of Lyme, took the third premium. His soil is a gravelly loam, cultivated the two previous years in corn, and the third year previous in grass. Forty loads of barn-yard manure were plowed in deeply for each crop of corn, and a dressing of 150 bushels of ashes the first year. No manure was applied to the land when in grass. The land was plowed June 1, and planted June 5 with six quarts of Dutton corn three feet and a half apart each way. The seed was soaked until nearly ready to sprout, and ten days after planting it was up and hoed; and again the last of June; and the third time about the middle of July. The land left perfectly flat, no hills being made. The crop was cut Sept. 30, and yielded 89 bushels per acre.

Whole value of crop	$95 50
Cost of cultivation	9 50
Balance of profit	$86 00

The value of the manure is not estimated, which would take off at least $20 from the profit, leaving it about the same as the other premium crops. It will be noticed that Mr. Bill plants very late, June 5. This is his practice every year. He plants, also, six inches farther apart one way, and a foot farther apart the other. With a smaller variety of corn, and closer planting, we think this acre would have taken the first premium."

Now, these crops were grown in as unfavorable a season as we have had in many years, in a State not marked upon our country's map as one of the corn-growing States, and not, so far as we can see, with a very extraordinary amount of labor, and yet with a very handsome profit, leaving the soil in better condition than it was before.

780. **When to Plant Corn.**—There is a rule, and one of no little importance, homely as it may seem, for fixing the proper time for putting the seed corn in the ground. It is a day in the calendar of the aborigines, which our Pilgrim fathers found established among these original corn-planters. In answer to the question, "What time in the spring do you plant corn?" the answer was, "When the leaves upon the oak-trees are as large as the ears of the squirrels that sun themselves on the branches, then our squaws plant the seed that has been so carefully preserved in the smoke of our wigwams."

There is much truth in the old Indian rule, both in preserving the seed, which was hung up in clusters of ears, by the braided husks, to the poles of the wigwam, and in the time of planting it—the time pointed out by nature, not the almanac, when the ground had become sufficiently warm to insure rapid vegetation.

Experience has proved that the 20th of May, as a general rule, corresponds very well with the time of putting forth oak leaves "as large as a squirrel's ear," and then it is the fittest time for planting. The next most fitting time is when you are ready, for upon getting land ready, and proper cultivation, depend all your success.

With straight rows, and a practiced hand to hold the cultivator, it leaves but little work for the hoes. Corn should be cut about the middle of September by the roots, and shocked. There will be more corn and better fodder. This process will give us corn at 50 cents a bushel or less.

781. **Seed Corn—Selecting, Saving, and Preparing it to Plant.**—Any man claiming the name of farmer who does not systematically select his seed corn in the field before the crop is harvested, can never be written down in our books as a good farmer. And this is a work, too, that must not be trusted to a graduate from any Corkonian institution. It is the business of the farmer himself. No ear, however large and sound, should be taken from a stalk that does not carry two full-sized, sound ears. No ear that is not well filled out with perfect kernels to the very point, should be accepted for seed, if a farmer—and a good farmer does—desire to improve his crop. The effect produced by Baden, by this practice of selection, was a universal regular production of four to seven ears upon all the stalks, until at length "Baden corn" became known as an improved variety. It is an improvement that any farmer can make. If you would grow great crops, the greatest pains must be taken with the seed. It should be carefully selected, and that from crops grown north of your own location, if only half a degree.

Many farmers contend that no kernel should be planted which has not been soaked to the point of sprouting; not one should be planted deep. Then if you do not neglect the after-cultivation, you may have a good crop of Indian corn, notwithstanding the discouraging character of prospects in the spring.

If the weather is such that you can not plant a great quantity, remember that you can have more bushels now from half the number of acres intended to be planted than from the whole, if the manure and labor are concentrated. But always bear in mind that the first and most important step toward a good crop is in the careful selection of seed. Mr. Thomas Spencer, of Cape Girardeau, Mo., increased the yield of corn in three years, upon the same ground, fully one third by simply selecting the seed in the following manner: When his corn was just coming into the proper state for roasting ears, he passed through his field, marking the ripest ears, judging by the silk. If there were two ears on the same stalk, he selected the upper one. When gathering his corn in the fall, these ears were carefully put away for seed.

Farmers! think of this every year. If you have neglected this course, or if the selection has been neglected while the corn stood where it grew, do not neglect it while you are husking. Save the best ear of all stalks that carry two or more, until you get an ample supply, and then put it away in a perfectly dry place. If you wish to change your seed, make it the business of a day to go about the country and see who has the best, and make your selection while it is on the stalk. The best time to gather seed corn is when it has just fully ripened, and the best way to keep it is to tie the ears in bunches by the husks and hang them up to the rafters. If in the loft of a smoky log-cabin, all the better. Smoke is as good for preserving corn as for corn-fed pork. Freezing weather in autumn injures more seed corn than anything else. It should always be saved before frost.

Many of the improved varieties of corn are accidental. This is said to have been the case with the Improved King Philip, an excellent variety, which produces ears of unusual length, as long as the best Dutton, the kernels being very large and deep, eight rows on the cob, and it ripens perfectly in one hundred days, producing very nearly double as much as the ordinary King Philip.

One of the curiosities of this improved variety is, that it does not appear disposed toward further improvement nor change. We have grown it intermixed with half a dozen sorts, all of which hybridized, while the Improved King Philip remained as pure as the seed we planted.

One of the best recommendations in relation to seed is this: Let each farmer plant, expressly for seed, from ten to a hundred hills in the richest ground he has, placing the hills six feet apart and allowing not more than three stalks to stand in each hill, so as to encourage each to develop three or four ears if possible. Let some of these hills be planted in the midst of potatoes, melons, cabbages, or other low plants, so as to secure them abundant air and sunshine, and thus no ground will be wasted, and in all probability seed will be obtained that will increase the next crop ten bushels per acre. It is an experiment that is worth trying.

Farmers can not be too careful about providing good seed. If you have it not of your own, buy it. Even if an exorbitant price is demanded, it will be economy in the end, for it requires labor to replant corn, and the second planting rarely amounts to anything in the way of ears; the first planting shades, and gets so much the start of it.

In some seasons the corn is generally uncertain about germinating; then it is best to get corn of the previous year for seed. If you can not get old corn, select new corn that you think will grow, and take one kernel from each of fifteen or twenty ears; put it, with some moist, mellow dirt, in an old crock or dish, and wet it occasionally with tepid water; keep it in a warm place, and you will soon have a test. In one experiment, where nine out of thirteen grew, we planted six or seven, instead of four kernels. If the germ of seed corn is feeble, and particularly if planted too deeply, the blade will curl up under the ground, and a great deal of it will never see the light; while some that does reach the top of the ground is so exhausted by the effort that it never recovers. Planting good seed, or so much poor seed that a sufficient amount will grow, is of more importance than may be imagined. Some farmers lose hundreds of bushels of corn by carelessness in this particular, and a general carelessness would materially affect the entire crop. One of the best farmers in New Jersey says:

"I would only use the best grains in the center of the ear. The land should be deeply prepared, and marked each way three and a half feet by three and a half feet, with seven or eight grains to a hill, and five stalks left to stand. We cover one inch deep, and cultivate with Knox's horse-hoe, and never hill up. We use the subsoil plow in preparing land and in cultivating. We prefer to plant in May to a later day. The White Flint corn is the most productive sort we grow. I have never known crows to eat corn. They certainly pull it up, for I have seen it lying upon the ground uneaten where they pulled it out. Our greatest pests are the blackbirds, which destroy a good deal of corn that pushes its point out of the husks."

A kind of corn called Dutton, much grown in the State of New York, is a Yellow Flint variety, eight-rowed and long ears, and productive of good crops, and this, if planted June 1, would generally ripen in the latitude of Albany. It requires one hundred days to come to maturity. There are several valuable hybrids of this variety that will ripen in the same period. If corn is ever heated in the crib, its germination is destroyed. Great care should be used to plant corn when the earth is in exactly the right condition of temperature.

From an experiment reported in the papers a few years ago, to test the question whether the seed taken from the middle of the ear is better than that from the ends, we gather the following facts, which are at least suggestive, if not conclusive, and should induce farmers to continue the experiment for several years, until each one is entirely satisfied. The following is the statement: Two acres were planted on a light soil, well adapted to Indian corn; manured with seven and a half cords of barn-yard manure to the acre, spread broadcast and cultivated in, and ten bushels of leached ashes and one hundred pounds of gypsum to the acre put in the hill. The corn was planted on the 3d day of June, in alternate rows, with seed taken from the large ends, middle, and tops of the ears. It was hoed three times in the course of the season. One acre was harvested and husked with care, and the result noted on the 19th of October.

The rows planted with seed taken from the large ends of the ears produced 738 pounds of sound corn, 77 pounds of soft corn on the ears and 1,360 pounds of stover.

That from seed taken from the middle produced 663 pounds of sound corn in the ear, 164 pounds of soft corn, and 1,290 pounds of stover.

That from seed taken from the small ends produced 747 pounds of sound, 53 pounds of soft corn, and 1,320 pounds of stover.

Comparing the crops on this acre, and estimating the sound corn at 1 and the soft corn at half a cent per pound, and the stover at 7 dollars the ton, the value of the crop, the seed of which was taken from the large end, was, 738 pounds sound corn, $7 38; 77 pounds soft do., 39 cents; 1,360 pounds stover, $4 55. Total, $12 32. That from middles—663 pounds sound corn, $6 63; 164 pounds soft do., 82 cents; 1,290 pounds stover, $4 51. Total, $11 96. That from the small ends—747 pounds sound corn,

$7 47; 53 pounds soft do., 26 cents; 1,320 pounds stover, $4 62. Total, $12 35.

From this experiment it appears that the very portion of the ear usually selected for seed is the least valuable, and the portion containing the small kernels actually produces the most sound corn, the least soft corn, and greatest quantity of fodder, and slightly exceeds either of the three divisions in cash value. Taking this one case as a basis, and it proves that it is hardly worth the while of any farmer to shell off portions of the grains of an ear, rejecting one and saving the other for seed. An experiment made by Lansing Wetmore, of Warren, Pennsylvania, upon four adjoining rows, gave eleven and a half bushels upon those with unprepared seed, and seventeen bushels upon the other. The preparation consisted in soaking the corn overnight in just enough soft water to cover it, in which one ounce of copperas to each quart of corn was dissolved. To a peck of corn, when you take it out of the steep, stir in a pint of soft soap. Then add plaster enough to make it dry, so that you can handle it easily for dropping. The argument used by those who favor the various modes of preparing seed, is that it gives the young plant a vigorous start into healthy life before it could look abroad for pabulum. "An old farmer" says, about saving seed corn: "My own observation and experience, during forty years, convince me that the best preparation and treatment of seed corn is to keep it on the cob till the ground is prepared to receive it. No coating—no saturating—no soaking. At the proper season, pulverize the ground well, and put the dry corn in immediately from the cob."

Still there are other farmers, of equal experience, who strenuously contend for the advantages of soaking seed corn, not only to hasten its vegetation, but to save it from the attacks of destructive vermin. A young farmer writes that "an old gentleman not far from me says: 'Soak the seed overnight in copperas water, and the wire-worm will not trouble it.' Who knows whether this is so or not?" To this question another correspondent makes this answer: "A good many years ago, when I was farming in Massachusetts, we had a field of corn that was at least two thirds destroyed by the wire-worm. A half dozen of these troublesome fellows were sometimes found sticking in a single kernel. We planted the second time, after soaking our seed over-night in a solution of copperas water, and I do not know that a single kernel failed. In after-years, we tried niter with equal success." Probably the best remedy against wire-worms is not to grow them. Keep no old meadows. Break them up. Plow all your sod and stubble land in autumn. Either bury your worm seed too deep to get out in time in the spring, or else freeze it to death in the winter. There is probably no remedy equal to deep plowing in autumn.

Another correspondent is equally sure that tarring seed corn is a sovereign remedy against all pests. He says: "Dissolve a pint of tar in hot water, sufficient to immerse a bushel of corn, and you will coat every kernel so that plaster, bone-dust, or ashes will adhere and cover each grain;

and this not only makes an unpalatable morsel for crows, squirrels, and other pests, but it will fertilize the young shoot so as to give it a vigorous start. Every variety of seed that vermin depredate upon may be tarred with great advantage."

But another one says: "Tar is oftener injurious than otherwise. So are all other applications to seed corn—whether to keep off devourers or to promote growth. A better preventive is to scatter corn on the ground around the margin of the field, and through it in different parts, if the field be large. As much corn as crows will eat, thus fed to them, will be found cheaper than scarecrows of any kind."

782. **Fertilizing Seed Corn.**—A great deal has been written of late upon the advantage of fertilizing seeds by soaking them in a solution of some substance that has the property needed to give increased vitality to the young shoot. Dr. Chamberlin, of Chicago, has made some experiments that convince him that nearly half the time might be saved in germinating the seed by the use of chlorid of lime. In one of his experiments he had in his office four boxes; in the first, the corn planted without soaking the seed, had not germinated, when the second, with seed that was soaked in warm water, had just commenced to germinate. In the third, seed that was soaked in a solution of chlorid of lime, showed green blades just peeping from the ground. In the fourth, seed soaked in a solution of chlorid of lime and copperas, in equal parts, showed blades nearly three inches above the ground. All the seeds taken from the same ear were planted at the same time, in the same quality of soil, and the boxes all had an equal share of heat and light, and equal advantages.

This experiment should attract the attention of farmers, and if from four to six weeks may be saved by the use of chlorid of lime and copperas, it is a matter of no ordinary moment, since a delay in the germination of two weeks may place the crop within reach of frost in autumn. The copperas used in soaking tends to prevent birds, squirrels, and worms from eating the seed. One pound of chlorid of lime and one pound of copperas, costing not over twenty-five cents, should be dissolved in sufficient water to soak seed enough for twenty acres; so every farmer could afford to make the experiment, even if he should fail to derive any benefit from it.

783. **Shall we Grow Two Ears upon a Stalk?**—It is the general opinion of farmers, that a field which averages two ears upon a stalk would give more bushels of corn per acre than a field of stalks bearing one ear each. But we have a statement from O. S. Murray, of Warren County, Ohio, that gives proof to the contrary of this position. He says: "After having my attention often turned to the subject, by what had been so repeatedly published in the agricultural papers, I went about taking observations for myself, several years ago. The result was, that in more than ninety-nine instances in a hundred, the largest ear on a stalk having but one had more grain than the largest two ears, or all the ears on any stalk having more than one. In a field of two acres, very well eared, I searched in vain

throughout to find a single instance where two or more ears on a stalk had as much grain as I could easily and often find on the largest and best ear where there was but one. In another season afterward, I mentioned the matter to a man who was helping me harvest a field of eight acres of superior growth. He was astonished at my suggestion, and quite unbelieving. So we went about the search and comparison—he looking for two ears or more on a stalk, and I for one. In a single instance, and that instance only, he found more on two ears on a stalk than I could find on one. We made numerous comparisons, and in every other instance my single ear had decided advantage over his two or more in amount and quality of grain; generally the difference would be considerable. These observations led me to the conclusion, that in the cultivation of our larger varieties, the true philosophy is to ascertain as nearly as possible the largest number of stalks that can stand on a given area with the largest single ears. Stop reducing the number of stalks at the point where in the first single instance the second ear will shoot on a stalk. Besides increasing the quantity and quality of grain, you save one half the work of husking. It is more work to husk a small ear than a large one. The swelling of the latter opens and loosens the husks for more ready removal."

In relation to planting corn very wide apart, Mr. Murray thinks there would be liability to failure of perfect filling on the cobs. Except in the most favorable conditions of weather as to winds and showers, there could not be a sufficient number of successful communications from the anthers to the stigmas at wide distances.

784. **Preparing Ground for Corn.**—This is the most important in all the laborious part of the work of making a crop of corn. Our choice would be a clover sod turned under in autumn, with a good growth of green clover, running the subsoil plow in each furrow, or else, if the soil was already in a deep mellow condition, we would plow it with the Michigan, or double-share plow, and in the winter, while the ground was frozen, haul and spread such a dressing of manure as we intended to give it, and then plow that in with a light plow, so as not to turn up the sod. We would mark the rows with a small subsoil plow, or else with a coulter, neither of which will make a furrow for you to plant in below the level of the surface. Indeed, upon wettish ground the following plan has been successfully used: Instead of plowing a furrow and planting the seed below the surface, where it will rot in wet weather, use an implement that will draw the loose surface-soil from each side of the line of the row into a ridge, or rather a flat elevation, and plant the seed upon that. In the lower part of Virginia, nearly all the land, particularly on the river bottoms, and what are called the "flat lands," is plowed in ridges. But we do not commend the plan, unless it is upon flat lands that can not be drained. On the other hand, we condemn the practice of planting in the bottom of furrows upon any land. If the soil is well prepared, by surface and subsoil plowing and harrowing, if the ground has broken up in lumps, there is no way that the seed can be so

well put in as with a drill. If farmers would spend more time in destroying the weeds before they go to seed, it will pay better than almost any other work. Three hundred years ago, Toralio wrote in Italy that the soil dug over eight times was better than manuring. The old Indian mode of piling up the loose earth around the stalks was a mere thing of circumstances by which they were surrounded, and like a great many other men before them, our sires and their sons became imitators. They never stopped to inquire or think why it was done. It was because the ground was not previously well prepared. If your ground was plowed in autumn or early spring, it has, of course, been beaten down by the rain, and is unfit for planting until plowed again. If you can not afford to do that, do the next best thing. Mark your rows with a subsoil lifter, or a long coulter, and commence using the cultivator or plow as soon as the corn shows above ground. If June proves dry and hot, the growth will, in default of deep plowing, be likely to fail; and, if the land has not been previously plowed deep, the use of the subsoiler, run close to the rows upon each side, may be the means, perhaps the only means, of saving the crop from ruin.

785. **Autumn Plowing and Wire-Worms.**—Speaking of autumn plowing, a farmer of Livingston County, N. Y., says: "If the ground on which corn is intended to be planted the coming season is sward land, and infested with wire-worms, I would not, by any means, advise you to plow in autumn, but just before planting, giving only time to suitably prepare the soil—even two or three weeks' difference in the time of plowing made more than one half difference with me in a crop of corn. It would be folly to think of planting the same ground to corn the ensuing year without plowing deep, and very late in autumn, for the wire-worms would most certainly destroy the crop." By this it appears that his only reason for not plowing in autumn is on account of wire-worms. If he will dress this sod ground with three to ten bushels of salt per acre, a few days before the corn is planted, we will insure him against the worms, and also insure the crop to be enough larger, on account of the salt, to pay for its cost. Dr. G. J. Locke, of Danby, Rutland County, Vt., gives the method by which he is successful in raising corn, which he thinks might be beneficially adopted by others:

"Plow sward land six to ten inches deep; then drag smooth with a heavy bush; then spread twenty two-horse wagon-loads of barn-yard manure per acre; then harrow till well mixed with the soil; then mark off and put a handful of dry hen manure in each hill, and cover it two inches deep; then drop the seed and cover it lightly with a hoe. Since I have taken this course, about four years, I have not had a hill of corn eaten by worms, while most of my neighbors have complained of having theirs destroyed. Whether it is the general chemical action in fermenting, or whether there is one or more elements in the hen dung that keeps the worms from the corn, I do not know. If the corn is planted on the hen guano, without its being covered with earth, it destroys the vitality of the corn. In this way I get from 40 to 85 bushels to the acre. Twenty hens kept through the winter, in a good hen-house, as they should be, letting them run out in the daytime when convenient, with the chickens I usually raise, will furnish sufficient manure for one acre of land, and will pay their keeping if properly taken care of, leaving the eggs as a clear profit."

We have one suggestion to add to this, and that is, that the sward be turned with a Michigan plow, which buries all the sod, and leaves several inches of loose earth on the surface, in admirable condition for receiving the dressing of manure. The recommendation of saving hen manure, and the profit of it, we fully indorse. Remember never to put lime or ashes in the hen-house, but you may use plaster, charcoal dust, fine muck, or loamy earth, so as to keep the mass, as it accumulates, quite inodorous.

One who has tried it, says that an effectual way to prevent cut-worms from destroying the first planting of corn is to sow broadcast half a bushel of seed per acre, and harrow it in, and then mark off and plant as usual. The sowed corn sprouts first, and the worms eat it, and let that in the hills alone. At the first hoeing, if any hills are missing, fill them with plants from that sown broadcast, and plow under the balance. It will not hurt the soil any. An old corn-planter says: "To prevent the black grub from eating corn, take strong ashes and plaster in equal parts, and put a good handful on each hill as soon as planted." A Michigan farmer plows in clover sod in autumn, and applies all his manure to it in the spring, working it in thoroughly with the cultivator and harrow. He says: "Hoeing the corn fits the ground well for wheat, and I sow it as soon as the ripening of the corn will admit. After the wheat comes off, I plow in the stubble, and in the spring sow oats, timothy, and clover. I get three crops of grain, one of them wheat, in three years, and get the land back to clover in the time. Last year my corn yielded 100 bushels of ears per acre, and the wheat this year, on the same ground, averaged 14 bushels per acre, though it was badly shrunk These crops were raised on land which was thought nearly barren when it came into my possession."

786. **Depth and Distance Apart of Planting Corn.**—If you prefer corn in checks rather than drills, we recommend putting at least five kernels to a hill, two of which may be pulled out if all grow. Let it be the law of your farm never to cover seed corn very deep; if it is, it will be delayed in its growth, and some will never reach the surface, and some that does will look yellow and feeble. You may be pretty sure that corn planted three and a half to four feet apart will grow as luxuriantly, and will be far better than if planted more sparsely; for, in the latter condition, the silk does not receive the pollen so freely. The outside row, growing quite as rank as the other, is, for the above reason, not usually as well filled. As a general rule, the closer the ground is planted, the better the corn grows and ears, if the soil is naturally or artificially strong enough to carry a heavy crop. Upon sparse planting, an observing farmer says: "I have always noticed that where single stalks have come up from seed accidentally drop-

ped in a garden, how rich soever the soil might be, they bore nothing but miserable pig ears. I account for it thus: the stalk standing alone, the wind blows the pollen from the spindle, not upon its own silk, but away from it."

In the Southern States, sparse planting is the rule. A farmer gives as a reason for shallow planting, that "corn planted at three quarters of an inch deep came up in six days; and corn at two inches, nine days; and five inches, seventeen days—the same seed and same preparation in the same field. I lost half of a crop once from deep planting. I would put the manure four inches deep, covered with soil, and the corn covered only half an inch deep. All self-planted corn grows from shallow planting; and this is the case with all tree seeds. Much depends upon the state of the weather at planting, as well as the condition of the soil. The distance between hills should depend upon the kind of corn. For Southern and Western, five feet is about near enough for a profitable crop. For Dutton, three and a half to four feet. For Early Canada I planted once twenty-two by twenty-four inches, four kernels in a hill, and I had one hundred and one measured bushels on a measured acre."

787. **Cultivation of Corn.**—One who advocates early planting says: "As a general thing, it is much less work to tend the crop. I say, drills for corn by all means. Each time you haul dirt to the stalk, it throws out a new set of roots, as corn requires breathing tubes at the ends of its rootlets. Go into a cornfield which has been left 'decently alone' after it is two feet high, and try to find an inch square of ground without corn rootlets protruding from it! Does the plant know best what it requires? If not, cut and haggle away at its roots, as your grandfather did before you!"

From all that we can read or hear about corn, and after some experience, our motto is level culture, and such preparation of the ground as to fit it so as to require but little after-cultivation. There is no labor on the farm, perhaps, that will pay better than working corn at the proper time, and in a drouth, all the time. Instead of hand hoeing, use some of the light horse hoes, with which one man will do more good than ten with hand hoes, following a mold-board plow. As for manuring corn, that is a necessity in all the Eastern States. Upon the rich lands of the West it will not pay. It is idle in the older States to plant corn upon a majority of the farms without purchasing some kind of fertilizer. We have never recommended a farmer to neglect his barn-yard manure, but to add to that guano, bone-dust, improved superphosphate, and everything of the kind that he can buy, because no farmer can make as much manure as he can use profitably. It is nonsense for a farmer to be content with forty bushels of corn per acre when he can get eighty bushels by $3 more expense. It is nonsense to say that barn-yard manure is all that is necessary to be applied to any land, or that it is not profitable for a farmer to purchase just such specific manures as analysis or experience shows the land requires. As to working among corn, commence as soon as the rows show, using a subsoil plow, two furrows between each pair of rows, running as close as you safely can to the corn, and follow with a horse-hoe to brush over the unbroken surface and kill any remaining weeds, but leave the surface as nearly level as possible. In two weeks repeat this operation, keeping farther from the corn with your plow. Once or twice thereafter run through the field with a cultivator or horse-hoe, and if any weeds remain, uproot them with the hand or hoe, but do not let any plow go down three inches below the surface after the plants are a foot high. If the corn looks well, pull one or two of the feeblest stalks in each hill at the second plowing. If you have not applied ashes or plaster before planting, throw a handful of the two mixed upon each hill before plowing the second time. The distance traveled in cultivating an acre of corn is greater than most persons suppose. We have seen one statement made from actual calculation, that gave sixteen hundred miles as the aggregate travel in growing a hundred acres of corn. Is it not worth the time and calculation of some farmers who grow very small acreable products to inquire how much they have traveled to produce each bushel, and what they shall do to lessen that distance? If it requires sixteen miles of travel with a horse to each acre of corn, farmers must get a better yield than some of them do to make the business pay a fair compensation for so much travel.

788. **Transplanting Corn.**—Transplanting corn can be done with as much ease and certainty of success as cabbage. For early roasting ears, corn could be started in frames so as to give it three or four weeks the start of corn planted the usual way. Transplanting would be valuable also in the field where hills are missing. The safest way to do it is to make up a mixture of cow-dung, loam, and water, of the consistence of thick porridge, and dip the roots in it as they are taken from the ground with a transplanting trowel, and carried in this to their place, where, being carefully set, and shaded, if it is sunny, with a bush or some artificial shade stuck in the ground, they will be almost certain to live and grow. Like all transplanting, it is best done when the soil is wet.

789. **Pop-Corn is Profitable as a Crop.**—It is said of a Boston merchant now engaged extensively, that he commenced business as a peddler of pop-corn by the cent's worth. Is it any wonder that he grew rich—that is, rich enough to enlarge his sphere of action—particularly if he raised his own corn, or got it of those who did, at about first cost? Let us look at the profit. A writer in the *New England Farmer* "calculates the value of an acre of pop-corn, at the prices which city residents pay for the article when fitted for their palates—that is, when parched and on sale by the grocers and candy men—at four cents a quart, and calls a quart the product of a middle-sized ear. The corn may be planted three feet by eighteen inches. Allow eight ears to the hill, which is not equal to the average, and it would be about eight thousand hills, or sixty-four thousand ears to the acre. This is $2,560 per acre, paid by those who eat the corn. Take away half the amount, if you please, for every contingency which may be thought of, and

we still have $1,280, which the consumers pay for the product of an acre of ground; and who among them pretends to call pop-corn dear eating?" But this, the farmer will say, is the price of the article manufactured. It is not what I should get. True, but still the price is liberal. The crop of 1860 we sold at 87½ cents per bushel of ears, wholesale in New York, and we are told it has been worth that price, or more, in previous years. We are sure that one hundred bushels per acre can be easily grown, and the stalks being small, make excellent fodder. It is well worth growing to feed poultry; and as a crop, we are fully satisfied that pop-corn is profitable. We have treated largely of its value as food (see 418), and now add the chemical cause of the effect produced by heat. The popping of corn is in reality chemistry made easy, by bringing it to the very fireside. It was formerly attributed to the conversion of the water contained in the starch into steam, but modern science has proved this phenomenon to arise from the rupture of the cells in the glutinous part of the grain by a conversion of the globules of oil into gas. If an attempt be made to pop the Tuscarora corn, which contains no oil, it will never succeed. Popping effects a change in corn of considerable importance, for it is much more digestible by man after this decomposition and extrication of the oil, though not so fattening to animals

790. **Various Experiments in Growing Corn.**—Table showing the results of experiments on Indian corn, made in 1857, near Rochester, N. Y., by Joseph Harris, editor of the *Genesee Farmer* ·

A.	B.	C.	D.	E.	F.	G.	H.
1	No manure	60	7	67	—	—	—
2	100 lbs. plaster (gypsum, or *sulphate of lime*)	70	8	78	10	1	11
3	400 lbs. unleached wood ashes and 100 lbs. plaster (mixed)	68	10	78	8	3	11
4	150 lbs. sulphate of ammonia	90	15	105	30	8	38
5	300 lbs. superphosphate of lime	70	8	78	10	1	11
6	150 lbs. sulphate of ammonia and 300 lbs. superphosphate of lime (mixed)	85	5	90	25	—	23
7	400 lbs. unleached wood ashes (uncertain)	60	12	72	—	5	5
8	150 lbs. sulphate of ammonia and 400 lbs. unleached wood ashes (sown separately)	87	10	97	27	3	30
9	300 lbs. superphosphate of lime, 150 lbs. sulphate of ammonia, and 400 lbs unleached wood ashes	100	8	108	40	1	41
10	400 lbs. unleached wood ashes	60	8	68	—	1	1
11	100 lbs. plaster, 400 lbs. unleached wood ashes, 300 lbs. superphosphate of lime, and 200 lbs. Peruvian guano	95	10	105	35	3	38
12	75 lbs. sulphate of ammonia	78	10	88	18	3	21
13	200 lbs. Peruvian guano	88	13	101	28	6	34
14	400 lbs. unleached wood ashes, 100 lbs. plaster, and 500 lbs. Peruvian guano	111	14	125	51	7	58

A. No. of the plots.
B. Descriptions of manures and quantities applied per acre.
C. Bushels of ears of sound corn per acre.
D. Bushels of ears of soft corn per acre.
E. Total number of bushels of ears of corn per acre.
F. Increase per acre of ears of sound corn.
G. Increase per acre of ears of soft corn.
H. Total increase per acre of ears of corn.

The superphosphate of lime was made on purpose for these experiments, and was a pure mineral manure of superior quality, made from calcined bones; it cost about 2½ cents per pound. The sulphate of ammonia was a good commercial article, obtained from London at a cost of about 7 cents per pound. The ashes were made from beech and hard maple (*Acer Saccharnium*) wood, and were sifted through a fine sieve before being weighed. The guano was the best Peruvian, costing about 3 cents per pound. It was crushed and sifted before using. In sowing the ashes on Plot 7, an error occurred in their application, and for the purpose of checking the result, it was deemed advisable to repeat the experiment on Plot 10.

The following table gives the results of the other experiments:

A.	B.	C.	D.	E.	F.	G.	H.
1	No manure	75	12	87	—	—	—
2	20 loads barn-yard manure	82½	10	92½	7½	—	—
3	150 lbs. sulphate of ammonia	85	30	115	10	18	—
4	300 lbs. superphosphate of lime	88	10	98	13	—	—
5	400 lbs. Peruvian guano	90	30	120	15	18	—
6	400 lbs. of "cancerine" or fish manure	85	20	105	10	8	18

A. No. of the plots.
B. Descriptions of manures and quantities applied per acre.
C. Bushels of ears of sound corn per acre.
D. Bushels of ears of soft corn per acre.
E. Total number of bushels of ears of corn per acre.
F. Increase ears of sound corn per acre over unmanured plot.
G. Increase ears of soft corn per acre over unmanured plot.
H. Total increase of ears of corn per acre.

As before stated, the land was of a stronger nature than that on which the first set of experiments was made, and it was evidently in better condition, as the plot having no manure produced 20 bushels of ears of corn per acre more than the plot without manure in the other field.

Plot 4, with 300 pounds of superphosphate of lime per acre, gives a total increase of 11 bushels of ears of corn per acre over the unmanured plot, agreeing exactly with the increase obtained from the same quantity of the same manure on Plot 5, in the first set of experiments.

Plot 3, dressed with 150 pounds of sulphate of ammonia per acre, gives a total increase of 28 bushels of ears of corn per acre over the unmanured plot, and an increase of 22½ bushels of ears per acre over Plot 2, which received 20 loads of good, well-rotted barn-yard dung per acre.

Plot 5, with 400 pounds of Peruvian guano per acre, gives the best crop of this series, viz., an increase of 33 bushels of ears of corn per acre over the unmanured plot, and 27½ over the plot manured with 20 loads of barn-yard dung. The 400 pounds of "cancerine," an artificial manure made in New Jersey from fish, gives a total increase of 18 bushels of ears per acre over the unmanured plot, and 12½ bushels more than that manured with barn-yard dung, though 5 bushels of ears of sound corn and 10 bushels of "nubbins" per acre less than the same quantity of Peruvian guano.

The result of the following detailed experiments was published in the *Rural American*. Ten equal quantities of White Flint corn were treated as follows:

No. 1, I soaked in tar water eight hours, until it was perfectly black, then rolled in lime.

No. 2 was merely immersed in tar water, ana rolled in lime.

No. 3, soaked in clear water over-night, then immersed in tar water, and rolled in lime.

No. 4, immersed in tar water, and rolled in ashes.

No. 5, soaked in clear water over-night, then dipped in tar (not tar water), and rolled in ashes.

No. 6, soaked over-night in clear water, immersed in tar water, and then rolled in ashes.

No. 7, soaked in tar water eight hours, until perfectly black, and then rolled in ashes.

No. 8, immersed dry in tar, and then rolled in lime.

No. 9, soaked in clear water over-night, and dipped in tar, and then rolled in lime.

No. 10, immersed dry in tar, and then rolled in ashes.

On the 23d of May I planted the several prepared parcels in similar soil, at an equal depth as nearly as possible, and each parcel received like treatment and culture throughout the season. Now mark the result:

JUNE 8.	JULY 26.
No. 1. Only about one quarter of the grain germinated—looks weakly.	About one half the grain up.
No. 2. All the grains up—looking middling well.	Somewhat backward, but promises better than No. 1.
No. 3. Every grain up, and looking nicely.	Growing finely—promises well.
No. 4. All up; look tolerably well—not so well as No. 3.	Backward, weakly, and spindling.
No. 5. Tardy—just up—very weakly.	Very backward.
No. 6. Every grain up—looks first-rate.	Thrifty—promises well.
No. 7. Only one half the grains germinated—weakly.	Middling—rather better than Nos. 4 and 5.
No. 8. Every grain up—looking well, and growing finely.	Looking exceedingly well—the best of the ten parcels.
No. 9. About one third the grains up—rather weakly.	Tolerably well—a trifle better than No. 7.
No. 10. Only about one tenth of the grains up—weakly.	Remained long in ground before it germinated—very backward—about the same as Nos. 4 and 5.

Soon after the corn came up, No. 6 appeared to be the most thrifty and promising; No. 3 looked nearly as well, but No. 8 soon shot ahead of No. 6, and remained so through the season.

Nos. 4 and 5 were the most backward of any.

On July 26th, Nos. 3, 6, and 8 I judged to be from two to three weeks in advance of Nos. 4, 5, and 10; the former Nos. being silked and tasseled, while none of the others were. No. 8 was the most forward—ears best set, and largest.

No. 8 finally produced the best corn, and the most of it. So of all the above preparations I give that mode of preparing the preference.

There is an evil I think, however, attending the application of tar in any shape to corn previous to planting; it retards the germ, while at the same time I know of no benefit I have received from its use.

791. **The Yield of Corn per Acre.**—This question causes much controversy, as the modes of measuring have been so diverse. Weighing the ears grown on an acre is certainly better than measuring off one square rod, and shelling the corn, and multiplying by one hundred and sixty. "A good deal depends upon what we call a bushel, as corn will shrink from December to

May fifteen per cent. A good crop is sixty bushels per acre. Premiums are often awarded to a very rough manner of measurement. Never count your crops until sold; upon whatever they measure then, estimate the yield per acre." Some say that corn shrinks twenty-five per cent. in weight between the time it is ripe enough to gather, and the next summer. If you wish to estimate how much an acre of corn will yield while standing, count the hills, or estimate the number upon an acre, and shell the ears from a given number, and measure the grain, and calculate from that base. If you have four thousand hills per acre, and a pint of corn per hill, your acre will yield sixty-two and a half bushels, as it measures at that time, and so in proportion. To make one hundred and twenty-five bushels per acre, each hill must give a quart, and there must be none of the number missing. You may find now and then a square rod that will yield a quart per hill, but who gets such a yield from every rod of an acre? and if one could, let him be sure that it does not cost too much. If we can grow sixty or seventy bushels per acre, we are doing well.

It is certified that James Armstrong, of Knoxville, Tenn., raised, in 1859, upon forty acres of land, four thousand bushels of shelled corn, measured in the half bushel, which weighed sixty pounds per bushel. The best acre of the forty gave one hundred and sixty-six bushels. The same forty acres produced, with the corn, fifty two-horse wagon-loads of pumpkins, forty bushels of Southern peas, and ten bushels of beans, yet we do not believe that the average yield of all corn crops in the Southern States is ten bushels. The yield of nine lots of ten acres each, entered for premium at the State Fair of Kentucky a few years since, is given by the committee as follows:

	Bbls.	Bush.	Qt.	
J. Matson, of Bourbon	37	4	1	per acre.
Peter Pean, of Clarke	37	4		"
S. H. Chew, of Fayette	27½			"
J. Hutchcraft, Bourbon	23			"
A. Vanmeter, Fayette	21	3½		"
A. Hedges, Bourbon	21	2	1	per acre.
E. W. Hocaday, Clarke	20			"
Dr. Dudley, Fayette	20			"
H. Varnon, Bourbon	19	3		"

A barrel of corn in Kentucky is five bushels of shelled corn.

About the year 1840 (or 1841), Mr. Bryant, and Mr. Young, of Jessamine County, Ky., each grew a crop of five acres, which averaged one hundred and ninety bushels per acre, according to a well-certified report.

Over one hundred bushels of corn per acre, in Maine, are reported by John H. Willard, of Wilton, Franklin County. He says:

"I have repeatedly, within a few years past, raised from eighty to one hundred and ten bushels of dry shelled corn to the acre. All my farming is on a small scale; but the same cultivation would produce the same results on a large as on a small scale. The best crop I ever raised was in 1853, which was the best corn season we have had in this vicinity for many years. The produce that year was fifty-five bushels and eight quarts from half an acre. I proceed to give an account of the various steps I pursued in raising that crop, and shall persevere in following nearly the same course till I learn a better. The soil is a gravelly loam, and the land stony. The stones near the surface had been removed, and put into a wall. As to the component parts of the soil, I am as ignorant as most farmers are respecting theirs, having no means of ascertaining. I only know it contains a fair portion of lime, having previously raised a good crop of wheat on the same land. The wheat was sown on the sward newly broken up. Soon after the wheat was cut, I plowed in the stubble, and plowed very shallow, say from two to four inches deep, so as to just cover the stubble, and not disturb the sward. In the spring, put on six cords of manure, twelve to the acre, one half spread, and the other half in the hill. I spread the manure, and harrowed previous to plowing; then plowed and cross-plowed about ten inches deep, being a little deeper than the land was previously broken; plowed fine, that is, in narrow furrows, not more than two thirds the width the plow would turn. After harrowing, I furrowed the rows straight, three feet eight inches apart, and put the hills two feet four inches apart; covered the manure in the hills before dropping the corn, which I put in liberally, nearly double what I wanted to grow; covered the corn thoroughly from two to three inches deep; hoed the corn thoroughly twice, having run a cultivator twice between the rows before each hoeing, and having thinned the corn to five stalks in each hill previous to the second hoeing, by pulling up the poorest stalks. I cut the corn up at the roots, when the stalks were wilted above the ears, and green below, and cured in shook before husking. The seed was thoroughly dried by the ears being hung near a fire. The manure used was stable, part cow and part horse, with a good deal of straw litter, kept under cover till spring, and one or two hogs kept on it. The largest part was from horses well grained. The coarsest part, or last made, was first hauled to the field and put in a heap to ferment for the hills, the other spread. When the heap got into a high state of fermentation, I pitched it over to prevent its burning. I know it is said that manure must be thoroughly decomposed before it is food for plants; hence many infer it must be in that state when put on the ground; but I have had the best luck when I put it into the hill in such a state of fermentation as to be uncomfortably hot to the feet through thick boots, and planted and covered immediately before it cools. I had no potatoes, pumpkins, or beans, and but few weeds among my corn, for weeds are the most unprofitable crop I ever raised."

We hope a good many small farmers who read this account will pursue the same course, and raise an equally good crop. The way to do it is simple and sensible.

Dr. John T. Tuttle, of Rye, twenty-five miles northeast of New York city, near Long Island Sound, gives the following interesting statement of what kind of a corn crop can be produced upon such a forbidding soil as the most of the land in this region of country:

"According to request, I send you an account of my crop of corn grown on two fields, one containing eight and a half, and the other six acres, making fourteen and a half acres. I paid $150 per acre for the land. It being too wet, naturally, for good corn land, I determined to drain it, and accordingly laid six hundred and forty rods of three-inch sole drain tile, which was sufficient to thoroughly drain the fourteen and a half acres. The tile was laid about three feet deep; this is necessary, in order to get it out of the way of the frost. If laid too near the surface, and permitted to freeze, it will crack, fall in, and destroy it. This land being originally very poor and neglected, I was obliged to bestow much labor on it, in order to reclaim and make it productive. Completing this result, I valued my land at $400 per acre. I then plowed it, turning the soil up eleven inches deep, following with a subsoil plow, so that the entire piece was mellowed to the depth of eighteen inches. I then carted on three hundred loads of good composted manure, and harrowed it in. I marked out eight and a half acres for planting, three feet each way, and planted it with Improved King Philip corn, four grains in each hill; the balance of the plot of six acres I marked out three feet in drills, and planted it nine inches apart in the drill, one grain in a place. The fourteen and a half acres yielded two thousand two hundred and seventy-six and a half baskets of ears; each basket yielded eighteen quarts of shelled corn, making an average of eighty-eight bushels, one peck, two quarts per acre for the entire plot. The six acres planted in drills was much the best corn, and the yield much the largest; this I estimated at one hundred bushels of shelled corn per acre. I should recommend this mode of planting in drills; the yield is much larger than the hill system. I think the Improved King Philip the most productive corn in cultivation, and as it ripens in less than one hundred days, is sure to escape the early fall frosts; it is a most valuable variety of corn. The following is the average result of the fourteen and a half acres:

Dr.	
Interest on 1 acre, value per acre, $400..	$28 00
Twenty loads of manure, per load $1....	20 00
Plowing and subsoiling, per acre........	6 00
Harrowing, per acre....................	1 00
Marking out for planting	75
One peck corn seed....................	25
Planting, per acre......................	1 28
Running cultivator through four times..	4 00
Hoeing once...........................	1 25
Cutting up corn from the ground.......	1 50
Gathering 160 baskets, at 3 c. per basket	4 80
Total..........................	$68 83

Cr.	
Eighty-eight bushels, one peck, two qts., at 75 cts. per bushel...............	$66 23
Three tuns stalks, at $5 per tun.......	15 00
Four and one half cords pumpkins, at $2 per cord........................	9 00
Seventy-five bushels turnips, at 20 cents per bushel.........................	15 00
Total........................	$105 23
Profit........................	$36 40

The following is the corn crop of an Ohio farm: About five miles below Chillicothe, Ohio, there is a tract of high river bottom-land, known as the "Claypool Farm," now owned by the widow of James Davis. The corn crop of 1858 was forty-seven thousand bushels, sold at seventy-five cents a bushel to a distillery. We submit the problem to political economists, of how many persons the products of this one farm would have fed one year, and how many its products will make miserable after passing through that distillery.

792. **Two Hundred Bushels of Corn per Acre.**—It has been published—and, so far as we can see, duly certified—that Dr. J. W. Parker, of Colum-

bia, S. C., grew, in 1857, upon his farm near that town, two hundred bushels and twelve quarts upon one measured acre of ground, and one hundred and sixteen bushels and six quarts upon another acre.

In the report to the State Agricultural Society, Dr. Parker states that the seed selected for planting was from North Carolina, and designated "Bale Mountain Corn." After soaking it during the night in a strong solution of niter, it was planted from eight to twelve inches distance in the row, covered with hoes, and the ground rolled, leaving it perfectly level. The land was the border of a small creek, underdrained, and prepared by plowing in November, and manured in December with twenty-five two-horse loads of cow-house manure, plowed in, and followed by a subsoil plow drawn by two mules. About the first of March another coat of good stable and cow manure was spread, and plowed in. Early in April, three cart-loads of air-slaked lime, and two sacks of salt were spread over each acre, and lightly plowed under. On the 14th of May the ground was thoroughly plowed with Glaze's large iron plow, harrowed level, and laid off thirty inches apart with a shovel plow. Guano and plaster were sprinkled in the furrows, near two hundred pounds of the former, and three hundred pounds of the latter to each acre.

On the 14th of May the corn was plowed with a long, very narrow plow, and dressed over with hoes. On the 5th and 17th of June the same work was repeated, each time leaving the ground level. About the first of July it was necessary to draw a ridge about the roots of the corn to prevent its falling. During a protracted drouth, acre No. 1 was twice irrigated, and acre No. 2 had the water turned on it once.

The yield of acre No. 1, as before stated, exceeded two hundred bushels. No. 2 was partly replanted, which the committee say prevented the yield being as large as the other.

True, this crop cost labor and manure, but does it not pay better than the tens of thousands of acres that do not yield ten bushels per acre, for such are as common as blackberries all over the Southern States. The land used being "sand-hill branch land," required the high manuring, as it is not naturally fertile enough to produce such crops. The secret, however, is in the underdraining, the frequent plowing, and subsoiling and irrigation.

793. **How to Bind Corn Shocks.**—Hiram Harris, of Ohio, has made the world a gift of a valuable invention. It is a way easily to bind shocks of cornstalks, which have been cut and set up ready for binding, and which have to be hugged together tight enough to put the band on. This new plan saves that dirty, hard job. Any one can make the implement. It is a wooden spindle, round and smooth, sharp at one end, and long enough to thrust through the loose shock at the point where it is to be bound. On the other end is a crank and turning-pin, like the crank of a grindstone. A few inches from the crank is a cross-piece on the spindle, of a few inches in length, to one end of which a stout cord is attached, long enough to go round the shock and hitch a loop on the other end of the cross-piece. Now,

by turning the crank, the cord is drawn tight, compressing the loose stalks as firmly as may be desired, when the band is put on firmly and the crank unwound and applied to another shock. It enables the operator to do double the work, doubly better than he can without it; and as there is no strain upon the band in the attempt to draw it tight, as is usual in trying to compress the shock, there is no breaking of bands in putting them on, and they may be made of stalks, straw, bark, or twine. Any farmer can make one of these little implements, which saves so much labor. Indeed, a smooth young hickory, sharpened at one end, with a crank at the other, will be the best material. The rope should be small and very strong.

794. **Requisites in Harvesting Corn.**—1. Have a good corn-cutter.

2. Lay the corn (2 or 4 hills in a place) so that the tops of the second two rows will lie toward the tops of the first two, the tops of the fourth two toward the tops of the third two, and so on. By throwing the left arm over, never under the stalks, bending them down slightly, one blow of the cutter will generally bring down the whole: and a large field may be leveled at short notice, far quicker than the top stalks can be cut.

3. Make yourself a good corn-horse. Take a small pole, about three inches through at the large end, 10 feet or so in length, light and dry; if a little curving, so much the better. With an inch-and-a-half auger, bore two holes near the large end, so as to insert two legs, standing outward and forward, the curving side of the pole being upward. Next, bore a horizontal hole about $2\frac{1}{2}$ feet from the large end, into which a broken rake-handle or smooth stick may be run. Here we have a complete corn-horse all ready for use; the horizontal stick forming with the other four corners, around which we may set up the corn, 16 to 32 hills in a stook. Then tie firmly with wilted suckers or small stalks, or, what is better, rye straw bands, and bend down the tops and tie a small band over them, to shed rain, and then draw out the horizontal stick; take hold of the horse just behind the legs, draw it along a few feet and run the stick in again, ready for another stook.

. The husking may be greatly facilitated by first breaking off the ears. This is done by pressing the thumb and fingers firmly against the butt of the ears and bending over with the other hand. One may acquire the habit of breaking them off so that many ears will have few, if any, husks left. The stooks need not be untied. By a little ingenuity at contrivance, one may fix a low bench three feet wide, or so, throw a stook upon it, sit down with feet under the bench, begin at one side to break off, and make clean work as he goes; or he may kneel down to the stooks as they stand, or lie on the floor. If possible, let the corn be fairly glazed before cutting; but if a cold September morning, which threatens a hard frost at night, finds a field standing unglazed, I should prefer cutting and stooking, with the wilted side inward, to letting the frost take it. In such a case, it will harden off better in the stook than in the field.

The corn-horse described above has been used by many, and declared by all who have used it to really save one third the time usually employed in cutting up and stooking corn. Never top corn, and why? The sap which is elaborated in the leaf and upper part of the stalk is fitted to perfect the grain. The best farmers in the country settled that question years since. In a large field of corn one topped several rows, left the same number to ripen unmutilated, and cut up by the ground an equal portion at two different periods of growth, viz., one when the kernel was fairly seared, and another when the corn was thoroughly seared. The result proved, conclusively, that the corn cut at the ground when fairly seared was the best and heaviest, and the fodder was also best of all.

If you have not yet become fully convinced of the folly of cutting stalks, try the following experiment: Cut the stalks on fifty hills of corn at the usual time, cut up fifty hills at the ground when the corn is glazed, and let it mature in the shock, and let the stalks remain on fifty hills until fully ripe, and weigh the corn on each when dry. And try this: Plant the same quantity of ground with corn of the same kind, with compost manure, at the rate of twenty-five loads to the acre, and with guano, at the rate of 260 pounds to the acre, and weigh the corn in the autumn, keeping an account of the cost of each kind of manure on the land, and which ground is easiest kept clean of weeds.

When there is no danger of frost, adopt the rule to cut no stalk till the corn is ripe, and do not try to swindle nature by fishing for a crop of beans, or turnips, or pumpkins among the corn. One good crop each year is enough to exact of land in this latitude, and these extras often hinder the harvest as much in the loss of corn as they are worth.

795. **Corn Harvesting Machines.**—The following is the description of a patent corn-cutter:

A driver sits upon a small cart, drawn by one horse walking between two rows of corn planted four feet apart, either in hills or drills. Attached to the forward end of the body are two circular saws, arranged to work just as near the ground as may be desired.

These saws are driven by gearing attached to the cart-wheels, and one is designed to cut a row one side and the other on the other side; the horse walking forward saws off the stalks right and left, and, like all circular saws, the faster they run the easier they will do their work. The stalks as they are cut off are held by an arm so as to fall on a platform upon each side, which tips them off out of the way of the machine. It will be easy to arrange a machine to cut rows of any regular width apart, and the plan looks, on paper, as though it would work well on land, and be a real labor-saving machine.

Hon. Henry L. Ellsworth, when he was growing corn upon a large scale in Illinois, contrived a very cheap corn-cutter. Two pieces of wood, like the sides of a triangular harrow, were hinged at the point, and held apart at the wide end by a piece of hickory, represented by half of a stout hoop. The side pieces were armed with short scythe blades. The frame was supported upon blocks that raised it above the surface, and ran on the ground like sled runners. This frame, drawn by one horse between two rows of corn, had the blades pressed against the stalks by the spring, and cut them off as fast as the horse could walk; men following picked them up rapidly, setting them in shocks. The objection urged against this machine was, that unless the stalks were gathered row by row, as they were cut, they were apt to become tangled together, and the men said made, instead of saved, labor.

At the New York State Fair of 1861 we saw a corn-cutting machine that looked as though it would prove effectual. A few stout cutters are fixed upon the bar of a mowing machine, and a box to hold the corn as it falls, until enough accumulates for a bundle, when the driver by a slight movement opens the box and drops the corn. The horses walk by the side of the row to be cut, just as they do by the side of the grass. The additional expense to a mowing machine was stated at twenty-five dollars.

A corn-shock cart is in use in West New Jersey, which we thought a great labor-saving machine, by which a boy and one horse would move more shocks of corn in a day, where the distance was not over half a mile, than two men and a team could do in the ordinary way. A horse-cart, with a frame to tilt, having rather long shafts, and a windlass on the shafts behind the horse, with a stout rope fast at one end of the windlass, constitutes the machine. The cart is backed up to a shock, and the frame tilted up against it, and the rope thrown over, and the loose end hooked on the windlass, which is turned by a crank or arms, and winds up both ends of the rope, drawing the shock tight upon the frame, and that down to its place, when the windlass is fastened by a catch, and the horse trots off to the barn, or out upon the grass at the side of the cornfield, if the object is merely to clear the corn-ground, and then the catch being loosened, the frame and shock tilt back by their own weight, and the corn is set upright upon the butts, just as it stood originally. A pair of old city dray-wheels answer a good purpose to make a corn-shock carrier, and such a machine will be found extremely useful to those who wish to sow rye or wheat upon the corn-ground.

796. **Husking in the Field.**—A letter from Tioga County, Pa., recommends pulling down four shocks of corn toward a center, and then throwing the corn to that point from all, thus making one pile instead of four; and also laying the stalks, as the ears are stripped off, in bundles of equal size for binding. In commencing to husk a shock, stand up and drop the first stalks at your feet; then kneel upon them until you get enough to form a seat, when tired of kneeling. This change of position is said to be a great preventive of fatigue. It is recommended to pull down the shocks in the morning, when the dew is on, and bind them at evening, when a little moist. The best time to gather the ears of corn and store them in the crib is when they are hot and dry in the sun. The ears never should be thrown upon wet nor frozen ground, except the weather is cold

enough to keep it frozen. But, after all these directions for husking in the field, it is a question whether it is not altogether the best economy, where stalks do not grow larger than they generally do in the Northeastern States, and where they are valuable for fodder, to haul the shocks of corn up to the barn, so that all the fodder can be saved in good order, as fast as the ears are husked. Filling a large shed, or the barn floor, with the shocks of corn, to be husked on rainy days or evenings, is a good old fashion that need not be lost sight of in days of modern improvement, and the machine described in 795 will be found a very useful thing to those who wish to pursue this good old fashion.

A Pennsylvania farmer, John F. Overshire, of Athens, Bradford County, gives his mode of cutting up and husking corn in the field, which appears to be a very good one. He says: "I cut and set my corn in stooks of thirty-five hills to each, set in squares. I do not leave a hill uncut to support the stook, but bind a bundle to set in the center; and I never throw the corn down, but set it up as fast as cut, which takes less time, and there is no liability to injury from rain while lying upon the ground. In husking, never throw sound corn on the ground, but in baskets, sorting it at the same time. Empty the baskets into a cart or wagon, and thence to the crib. I place a husking bench between four stooks, and pull them to it, and it saves many hours of back-ache and cramps of limbs. A good husker can put sixty bushels of ears in the wagon in a day. The bench is two by five feet, made of inch boards nailed upon cross-pieces that hold legs put in a two-inch auger hole, so as to stand two feet high. The legs at one end being set back from where the husker stands against the end of the boards, he can crowd his stalks in a pile down between his own and the legs of the bench."

797. **Sowing Corn Broadcast or Drilling for Fodder.**—There are not many farmers who would not find a small plot of sowed corn the most profitable crop of the whole annually planted. Land produces of sowed corn a greater burthen of excellent fodder to use green, and, if cured, makes more of winter food for stock than any other grain.

We have sown corn broadcast upon a mellow piece of ground, plowed in after the first of July, and got a very heavy crop. It should not be plowed in unless the land has been previously plowed, because plowing the land as deeply as the crop requires would bury the seed too deep. The best way to plant this fodder crop is with a wheat drill. The next is to sow broadcast and cover with a gang plow, or share cultivator, that will turn the seed nearly all into straight rows. Some persons sow it wide enough between rows to be cultivated.

Warren Hutchins, Bethel, Vt., says.

"I plow evenly, sowing the seed in every third furrow, and roll the ground and harrow lightly in the direction of the furrows. I run a cultivator once or twice between the rows. If the crop is to be plowed in for manure, I commence about September 1, with a plank fastened on the beam to break down the stalks, so that they will turn under well, making my furrow across the rows. I find this a cheap way to enrich land that lies far from the stables.

"This day, June 1, I have sowed an acre for fodder, with the assistance of a boy half a day. Last year, a half acre left to ripen had 25 bushels of ears, besides a great yield of fodder."

It is preferable to cut the corn for fodder before the ears get of any considerable size, and as a general thing the crop is most valuable when grown so thick that ears are not likely to form; and when sown broadcast upon rich soil, and plowed in lightly, the last of June, it will grow of sufficient size and maturity for good winter fodder, before the usual time of frost, which in this latitude is usually about the first of October.

798. **Doura Corn for Fodder.**—This is one of the varieties of sorghum, much esteemed by some farmers for a fodder crop. Its great advantage over corn is that it will sometimes grow when and where Indian corn will not. One farmer says:

"Having found from experience that where stands of corn are broken it does not pay either to supply breaks with seed or to transplant, I have, for years past, done neither, but always plant Doura corn or sugar millet in all missing hills in my cornfields, and I have found it to do and pay well. When planted early, the Doura corn will make two or three heads to the stalk, and the first head will shell as much as an ordinary ear of flint corn; when planted late, say in April or May, it will still make as much as the corn, and it answers as an excellent substitute for corn to feed to poultry, besides making very good bread."

The above word is spoken of a region where February and March are the corn-planting months. In a wet season, the Doura corn here would grow a good fodder crop after the first of August. It is only by experiment that it can be determined which is the best for the purpose, the Doura corn or *sorghum saccharatum*, known as Chinese sugar-cane.

799. **Value of Sowed Corn for Soiling Milch Cows.**—For a soiling crop we do not know of any plant cultivated that is of greater value than Indian corn. In a large milk dairy, where sowed corn is much used at the time of our usual summer drouths, when pastures fail, the following results were noted:

From the first of April to the first of July there is a gradual increase in the quantity of milk produced; during the month of March it is stationary; it increases in April, as warmer and pleasanter weather comes on; and thenceforward the quantity keeps exact pace with the growth of grass and the advance of the season, until the maximum is attained in the first week of July. This point once turned, the yield decreases, by slow degrees at first, but with greater rapidity as the autumn months approach, and it can only be increased by feeding the green corn, and then the gain is sufficient to pay a large profit upon the soiling crop. For sowing broadcast it will require two bushels of seed per acre, and some prefer to sow three bushels. When used green, the objection urged against broadcast corn, that it is difficult to cure it, does not apply. With us the trouble about saving the stalks for winter was overcome with one heavy crop in this way. We commenced cutting and setting the stalks against the fence, and after clearing a strip about 30 feet wide, hauled poles from the adjoining woodland, and laid them on forked posts, and then cut another strip and set the stalks on each side of the poles, and so on through the field. This plan will only answer where woodland is very convenient. The stalks, however, may be bound in small bundles, and set up in rows, and will cure perfectly. When partially cured set them in shocks, to prevent bleaching. But we look upon this crop as more valuable for soiling than for preserving for winter use. In all cases where pastures are liable to be short in autumn, have a resource in reserve in a soiling crop of broadcast corn.

800. **Corn in Drills or Hills.**—A correspondent in East Hamburg, Erie County, N. Y., gives the following as the successful practice of Wm. Hambleton, of that place, in raising corn:

"After a faithful plowing, he makes furrows with a light plow, one way at 3½ feet apart. These furrows are then nearly filled with such a compost as usually accumulates every year about farm buildings, or by well-rotted stable manure, and on this the corn is drilled, the kernels six inches from each other in the row. From beginning to end he is death on the weeds, and the labor of raising corn in this way is hardly more than by the old method, while the harvest is doubled by it, and sometimes averages 100 bushels to the acre; and the greatly enlarged quantity of stalks pays every expense of cultivation."

We are much in favor of drilling corn, but not in favor of sustaining the practice by such statements as this, that "the harvest is doubled by it." If the land is rich enough to sustain corn in drills, six inches between stalks and 42 inches between rows, it will give 24,891 stalks to an acre 10 by 16 rods square; and the same land would grow four stalks in each hill, planted three feet apart each way, and that would give 19,360 stalks; and, as the stalks will produce equally, the result will be that if the drilled acre produces 100 bushels, the acre in hills will produce 79 bushels; or, say one fourth more, instead of doubling the crop; and that, we think, sufficient to induce any one to adopt the drill system. The estimate of Southern corn is 100 ears to a bushel. The ordinary Northern corn will require nearer two hundred than one hundred ears, as they average through the field, to make a bushel; but suppose we say 150 ears to the bushel, and that the stalks average one ear to each, the product in bushels per acre will be 165 bushels for the drills and 129 bushels for the hills. Is this result produced in one field in a thousand? and, if it is not, is it not a question worthy of consideration by the owners of the 999 fields, whether the rule should not be reversed so far that in a good season not one field in a thousand should produce less than 100 bushels per acre?

801. **Measuring Corn in Bulk.**—A correspondent of the *Prairie Farmer* gives a rule for ascertaining the number of bushels of shelled corn in a crib

of ears, by multiplying the cubic feet in the pile by (forty-five hundredths) .45. "Example: In a crib or bin of corn in the ear, measuring ten feet in length, eight feet high, and seven feet wide, there will be two hundred and fifty-two bushels of shelled corn. Thus—$10 \times 8 \times 7 \times .45 = 252$. This rule agrees with weighing corn—seventy pounds to the bushel in the ear. Assuming this rule to be correct, it will be very important to keep it where it can be readily referred to at times when it will be found very useful. But the rule applies only to localities where three heaped half bushels of ears make a bushel of shelled corn. In the Eastern States, where it takes two bushels of ears to make one of shelled corn, in order to use said rule we must proceed as follows: To find the contents of a crib ten feet long, eight feet wide, and seven feet high, $10 \times 8 \times 7 \times .45 = 252$. Then $252 \times 3 = 756 \div 2 = 378$, the number of bushels of ears, or one hundred and eighty-nine bushels of shelled corn of Eastern varieties. It would probably come nearer the truth to multiply the cubic contents in feet by $3\frac{1}{4}$, and cut off the right-hand figure, to wit: the number of bushels of shelled corn. Thus, $10 \times 8 \times 7 = 560$ feet; $560 \times 3\frac{1}{4} = 182$—cutting off the right-hand figure."

802. **Corn—Shrinkage in Drying.**—Experiments have been tried where the quantity of newly-gathered ears supposed sufficient to make a bushel of shelled corn, weighed seventy-five pounds, which, after being thoroughly dried, only weighed sixty pounds—nine of cobs and fifty-one of grain. The proportion of cob by weight to grain will generally average about one sixth; and we think the difference in weight of ears between the time of harvest and spring is never less than ten per cent., unless the corn stands until very ripe, and is then gathered in a very dry time. The shrinkage is more in the cob than in the grain, but there will be a considerable loss upon the grain, stored in a good crib, from autumn till spring.

803. **Yield of Starch per Bushel, and its Uses.**—As the starch in corn is the principal ingredient of value as food we should grow the varieties that afford the most. The average yield is about thirty pounds per bushel, and if not separated from the other ingredients, it will not prove too nutritious, although we generally take our food in a highly concentrated form, that is, too much starch to the bulk. All grain is more wholesome when used without separating its parts. Starch will not make as much fat as corn meal, though it is much used for food, and saves flour. It is also used in calico printing, not only as starch, but, by a chemical process, to make a sort of gum much required. It is very doubtful whether the largely increased manufacture of corn starch has proved beneficial to mankind, if it is true, as it has been stated, that nine tenths of it has been used for human food, since a corn-meal pudding is far more wholesome than a farina pudding, notwithstanding one is vulgar and the other fashionable—one tickles the eye as well as palate, while the other is the subject of an apology whenever offered to guests, even at a farm-house.

The increased demand for corn starch within a few years past has caused the building of immense manufactories; one in particular, at Oswego, N. Y., is very large; and the process, which is very simple, though requiring large space to conduct it in, separates all the starch contained in the corn, and makes as pure an article as can be made from any other substance. Indian corn yields a larger amount of farinaceous food to the acre than any other grain, and it is the most certain crop ever planted, but there is a great loss in going over a large space of ground—better make the same number of bushels usually made, upon one third of the space.

804. **Corn and Pumpkins Together.**—A writer in the *Genesee Farmer* objects, with a good deal of reason, to growing corn and pumpkins together, on account of the shade the vines give the land. He says: "I believe more than the value of the pumpkins is subtracted from the value of the corn crop. In Illinois we raise them in great perfection on the prairie sod, the first season after breaking. An acre of land cultivated entirely in pumpkins will yield an immense quantity; and I think this method preferable to planting among corn. The crop is a valuable one—I have made excellent beef with no other feed but pumpkins and hay. The pumpkins should be cut up, and fed in a clean trough. I had two hogs, one of which I intended to fatten, and the other to keep through the winter. As soon as pumpkins were ripe enough to gather, I shut them apart, and fed one on corn all he could eat, with an occasional pumpkin for sauce, with slops of the house, and milk. The other I fed entirely on pumpkins. They were both of an age, and size very nearly alike. In December I killed the one fed on corn, which weighed about three hundred pounds; the other was as heavy, but not quite so fat. I then concluded to fat the last one, and fed him on corn and pumpkins all he would eat. In about a month he was very fat, and weighed nearly a hundred more than the first. This experiment convinced me that pumpkins were good feed for hogs, and that corn and pumpkins fed together were much better than corn alone." Several other farmers are convinced that there is no profit in growing corn and pumpkins together.

805. **Corn Hybridizing.**—We planted one season some of the Improved King Philip corn, side by side with several other sorts, all of which hybridized, while the King Philip remained pure. The sort most affected was the little rice corn. Now, what is the philosophy of this mixing and running out of old sorts? Nature never works at random, nor is there a foolish thing to be found in all her works. They are full of mystery, but not of wasted forces. In this, as in a thousand other instances of hybridization, there is something to be learned. My own theory is, that this rice corn is a very low type in the family, perhaps only one remove from the original wild state, where each kernel is enveloped in a separate husk; and therefore nature, ever willing to aid man in improvements, makes a greater show upon this than any of the others, toward a variety that will be more valuable for cultivation; for that, though toothsome in its green state, is not to be compared to some of the best varieties of sweet corn for the table, and is not near as productive. The stalks are low and bushy, and may grow

close together, the ears small, and set near the ground. The principal object in growing it is for popping. The Improved King Philip has reached a high point toward perfection, that is difficult of further improvement. Hence it does not mix freely with any other sort. Nature shows plainly in this, that it has already expended its main force in bringing it up to its present point.

806. **Corn and Crows.**—Until the mooted question is settled, whether crows do more damage to farmers than they do good, we shall say: Frighten the crows, but do not kill them, except one to use to keep his fellows off your corn. Pick off part of his feathers, and scatter them on some spot in the field easily seen, and near by lay the carcass of the dead crow, and you will see his late companion sailing over the field, and looking down upon what has been done, but very careful not to light where he, too, might fall a victim. If you can not kill a crow, you may make a very good show of a dead one with a black hen. Crows are too valuable as vermin-destroyers on a farm, to be wantonly destroyed because they pull up a little corn. One farmer says: "In protecting fields from crows, he has found the best remedy to tie young crows to strings stretched across the field. Their calls drew a great many old crows, which came to see what the matter was, and went off, and kept off that year and the next." Another one says: "A very troublesome case of crow depredation was cured by suspending young crows dead, which so alarmed the old ones that they left in disgust. I find tarring corn seed a good preventive." If crows are to be kept off by any kind of scarecrows, they must be put up as soon as the corn is planted, before the thieves get a taste. That is the "ounce of prevention" that is "worth a pound of cure."

807. **The Cost and Profit of a Corn Crop.**—The growing of corn; the varieties grown; the manner of planting; how cultivated; whether high manuring, and much labor to produce a great yield per acre; whether corn shall be grown—particularly in the Eastern States—will always depend upon the cost of production; which, in all but the great fertile corn region of the West, is not less than thirty cents a bushel. There it can be grown for less—there it has been often sold below twenty-five cents a bushel. For many years in Kentucky, Tennessee, Ohio, Indiana, Illinois, a sort of universal price of corn prevailed, at a dollar a barrel, which is a local measure of five bushels. Yet during those years we have known large cargoes delivered on the bank of the Ohio, or its tributaries, at half that price; of course, for that is the custom, always in the ear, and at the rate of three heaped half bushels of ears for a bushel of grain. The general price of corn upon the Illinois Central Railroad during the summer of 1861 was ten cents a bushel, delivered in the ear, at a measure that would make a bushel of shelled corn. On the rivers it was not worth as much, and we heard of sales upon interior farms at three cents a bushel. At these prices corn does not pay ordinary farm-laborers' wages to grow it. The price it has sold for also proves that the great value of

land is not its richness; the great source of profit is not the great crops produced, but the market for that produce; and land is valuable just in proportion to its nearness to a place where its produce can best be sold. It ought to be a leading feature in the calculation of every land purchaser, Where is the market? Every producer should also keep this question constantly before his eyes, and shape his productions accordingly. Before the age of railroads the price of wheat in the interior of Indiana and Illinois was twenty-five to thirty-five cents a bushel, "store pay." It was not a cash article, because there was no market. Indian corn was still more a cheap drug on hand, and many a "broad horn" has been loaded upon the Wabash and other rivers for the far-off New Orleans market, with corn at six to ten cents a bushel. The strongest incentive to high farming is a high market. Is it profitable to grow corn in New England?

808. **Early Ripening Sweet Corn.**—Sweet corn, which is the kind that shows shriveled grains when fully ripe, and tastes sweet, is not an early ripening corn. Our pop-corn is fit for boiling two weeks before the sweet corn; but neither pop-corn, nor any other kind of corn, is to be compared to the sweet corn for table use, and is only tolerated by those who grow sweet corn until that is large enough to boil. There is a black variety of sweet corn that ripens early; but this we would only grow for early use, on account of its color, and that probably is one of the causes of its early ripening, as all dark-colored things absorb the rays of the sun. Some of this black corn has black cobs and husks; others, the grains only are black. We have grown an excellent sweet corn with white grains and dark-colored husks, which is quite early; that is, in ordinary seasons, fit to eat in July.

809. **The Value of Sweet Corn.**—There is no variety of corn that affords the farmer so much value, or gives so great a return for the labor of growing it, as sweet corn; and it should be grown in sufficient quantity to give every farmer's family an unlimited supply for the table at every meal, if desired, and also for the children and servants to roast and eat between meals, from July 20th to October 20th—three full months.

There is no food that can be furnished so cheaply, and none that is more nutritious and wholesome. It is always a welcome dish to chance guests, and in case of deficiency of other food at such a time, a dish of ears of green corn can be gathered, husked, cooked, and put upon the table in 30 minutes. And upon two or three ears a hungry man makes a satisfactory meal, with very little other food. In first cost, in cost of preparation, in value as food, is there anything equal to green corn? In value as food, so far as nutriment is concerned, sweet corn is 25 per cent. above any other sort, and 50 per cent. above as regards its wholesomeness. Being softer it is easier masticated, and goes into the stomach in better condition for digestion; and being almost entirely destitute of oil it is believed to be more easily digested than the common field corn.

Sweet corn should be planted for family use in hot-beds for transplanting;

or, if you have no hot-bed, in bits of inverted sod, in a box in the kitchen, so as to have them ready to put out in a rich warm spot as early as possible, and at the same time you should plant a few hills, and after that every two weeks till the middle of July. Stowell's Evergreen Sweet Corn can be planted so late that it will barely mature so as to be eatable when frost comes, previous to which if it is cut up and shocked, or packed closely in a room, it will remain fit for boiling till New Year's. Green corn may be preserved very late in autumn, by tying a bundle of straw, or cornstalks, around a hill of corn while it is growing, and before it is injured by frost.

Another value that sweet corn has is for drying for winter use. Scald the ears when the grains have acquired their full size, and cut them off and dry them in the sun, or in a very slow oven, leaving the door open to allow the moisture to evaporate. When dry, store it away for winter use in a bag of open texture, hung up in a dry store-room—on the rafters in the garret is a good place.

It may be cooked by soaking and boiling alone, or with beans, as "succotash;" and when boiled it may be eaten with meat or with milk, or with sirup; or it may be stewed in milk, adding butter and salt, and form an excellent breakfast dish.

A variety of sweet corn, known as the Excelsior, is considered the best where but one sort is grown. It grows two or three ears to the stalk, with twelve or fourteen rows to the ear, and is very rich when cooked.

810. **Broom Corn—How it is Grown, and Value of the Crop.**—We are aware that broom corn does not come properly under the head of this section, because it belongs to the Sorghum family. But as it will be more likely to attract attention under the head of Corn, we give it a place here.

In some sections of the country, particularly on the Mohawk River, broom corn is a leading crop upon many of the farms. It requires the best kind of soil—that is, soil that would produce forty or fifty bushels of Indian corn per acre. It also requires the best kind of preparation by disintegration and manuring, and then the seed is planted in drills or hills, like Indian corn, at about the same time in the spring, and it should be tended in the same way, thinning out the plants, which will probably grow in excess, as the seed is usually planted very thickly, and it must be carefully attended to at the first and second hoeing. When the broom corn is matured sufficiently, the heads are bent down before cutting. If the seed is to be saved in a mature condition, the corn is allowed to stand until the heads are well filled, but not dead ripe, when the heads are bent down by a man walking between two rows and bending all the heads inward. It is then allowed to stand until ripe, but not dry, when it is cut by a man walking between the same rows with a keen knife—a large-sized shoe-knife is about the best kind that can be used—cutting off the brush with six or eight inches of the stalk attached. The brush is thrown in bunches by the cutters, and is or should be immediately gathered up and carried to the barn, or somewhere under cover. It must not be cured in the sun. It is frequently stripped of the seed as fast as it is cut, and spread all through the barn, over the hay and grain lofts, or under sheds, or tied in bunches and hung against the walls.

The seed that is to be saved must be handled carefully, as it is very liable to heat. It may be cured in the sun, or spread upon the barn floor, or on a loft with a very open floor, and it must be frequently stirred so as to give it air.

Sometimes the brush is cured with the seed adhering, but it is not as well, as it is more difficult to cure it perfectly, and it is bulky and heavy to handle, and really in the end requires a good deal more labor. It is said, also, that the dry brush scrapes much harder than when first cut, and certainly it is more liable to be injured. For some work the brush must be cut and cured quite green before the seed is mature. Then it is scraped off and fed out at once, and is of about the same value as hay. The ripe seed, cured for winter feeding, is considered by some nearly equal in value to oats. We have never been satisfied that it was worth half as much. Perhaps it would be if ground. The stalks are not considered nearly as valuable as Indian cornstalks. If neat cattle are turned into the field after the brush is cut, they will pick off the leaves, but never eat the stalks. So they will if the stalks are cut and cured, and fed out in the winter. About the best use that the stalks of broom corn can be put to is to litter yards in winter to give cattle dry beds. They may also be used to make temporary shelter, or wind-breakers, for stock, or for covering root piles, or protecting more valuable forage from the weather. They are not valuable for manure, and would probably be the most so as mulch. It is the most common practice to let the stalks stand till spring, letting the stock pick and trample what they like, and then cut and burn the remainder on the field.

Scraping off the seed is a laborious job. A machine has been extemporized for this purpose, and is described as follows:

"Take an old fanning-mill (a new set of wheels in a strong frame, so that you could use a balance-wheel, would be better), put on two plank wheels in place of the fans, then take slats of the length you wish to make your cylinder, three inches wide and three fourths of an inch thick, hollow them a little at the ends, so as to fit the wheels; drive eight or ten wrought nails through each slat, and nail it to the wheels with the nail points out, in such a way that they will not be in straight rows around the cylinder, but bristling all over. One to turn the crank pretty smartly, one to hold on the brush in handfuls, and a boy to hand it up, will scrape two or three wagon-loads a day."

The value of the crop is the most important consideration to those who may be tempted to embark in the business. We have seen various estimates of the amount of produce per acre. We think that a tun of brush from five acres is a pretty fair estimate, and this will sell at from $100 to $150, or it will make up about one hundred and twenty dozen brooms, and any man of tolerable skill as a farm laborer can soon learn how to make good twine or wire brooms. There are machines used by broom-makers which greatly facilitate the work. They cost about $35 each.

The quantity of seed grown upon an acre we have seen rated as high as sixty bushels. We do not believe that one crop in ten will give that. The writer of an article now before us estimates the value of well-ripened seed for horses, sheep, and poultry higher than oats. The stalks, when left to ripen the seed, are of no value for cattle food. The seed is more valuable, but the brush is not; that is most valuable when cut green, and when the straw is fine, and retains a bright, lively color.

In January, 1860, it was estimated that 2,000 tuns of broom corn had been received in this city within a year past from Illinois; from Ohio, 500 to 600 tuns, and the same quantity from the State of New York. The quantity grown in the New England States is mostly manufactured before it reaches the city.

The average price of broom-corn brush is six cents a pound for the green sort, and four cents for the red brush. The average crop per acre at the West is 400 pounds; in this State, 350 pounds; in New England, 250 pounds.

It is not considered profitable to grow broom corn on a small scale; but as a crop it does appear to be so. There is a dwarf variety which has been recommended as more profitable for cultivation than the large and more common kind, because it furnishes finer and higher-priced brush; but for cultivation on a large scale there are serious objections against this variety —the sheaf of the upper leaf adheres so closely to the stalk it is very difficult to separate it. For family use this would not be so objectionable. It would only make a little work for small fingers, while larger ones were making brooms in winter evenings.

Shaker brooms are so common, that people generally suppose that broom corn is one of the staple crops of the Shaker Society. It may be in some families of the community, but not in all. The largest and oldest Society in the country, that of New Lebanon, Columbia County, N. Y., find it more advantageous to use their tillable land for some other purpose, and buy the brush, which they manufacture extensively, from the broom-corn farms of the Mohawk Valley. The soil there is not only productive in this crop, but the quality of the product ranks higher than it does upon the richer lands of the West, where the yield is larger, but the brush is coarser and less valuable.

In conclusion, we advise caution about embarking in the culture of broom corn, without more knowledge than we can impart.

CHAPTER IX.

THE GRASSES—CULTIVATION AND USE.

SECTION XLVI.—MOWING AND PASTURE LAND.—SEEDING LAND TO GRASS.—VARIETIES OF CULTIVATED GRASS.—WHAT IS GRASS?

WHAT is grass? may be more important to the botanist than to the farmer; but what farmer's son of ordinary intelligence would not like to be able to answer that question? How can he, if he is never taught? Who has told him that clover is not grass, and that Indian corn and sugar-cane do belong to the grass family? But it is not so much our present object to answer the question, as it is to speak briefly upon several practical things about the cultivation of grass and clover, and making them into winter feed for farm stock, and all matters that pertain to this very important crop. We are sure that every one who studies what we have compiled under the head of the grasses, particularly young readers, must be instructed in very important useful information. Natural grasses extend over the whole globe. Very curious and various provisions are made for the diffusion of the seeds; many of them are furnished with creeping roots. They are not, like other plants, injured by the laceration of their herbage. The making of artificial meadows is an art yet in its infancy. We never hear of them in England prior to A. D. 1681, nor in this country until about A. D. 1720. So little is known of natural or uncultivated grasses, that very few know the names of the grasses growing on their farms, nor can they distinguish one from another. One sixth of all the plants on the globe belong to the family of grasses—two hundred and thirty genera, including three thousand species, are already known, and new species are constantly presenting themselves. Six tenths of the cultivated area of New York is devoted to the growth of grass, and the grass crop of the United States is estimated at $300,000,000 annual value. Think of that, and you will see the importance of every treatise upon this farm crop.

811. **Varieties and Value of Grasses Cultivated.**—J. Stanton Gould, of Columbia County, N. Y., has devoted much attention to the study of grasses. Of those most commonly cultivated, he gives the following brief description. First, of the *Fescues:*

THE GRASSES, A STUDY FOR YOUNG FARMERS.

PLATE XIX.

(Page 748.)

This plate needs no explanation. It is a beautiful picture of some of the most valuable of our cultivated plants, which, collectively, make a farm crop so much more valuable than that which has been falsely called king, that when the two are fairly compared, "king cotton" dwindles into insignificance. Compared with grass, it is no more than a word. Without cotton we can live. Without grass, the world would be a desert, and man and beast would perish. It is because it is of such vast importance, that we have devoted a whole chapter to its consideration; and for the purpose of attracting attention to it, we have placed this picture as a frontispiece. Each one of these grasses will be found pretty fully described in the following pages, which should be studied with careful attention. The pictures may be depended upon as true representations.

"*Festuca ovina* is essentially a grass of the thin soils resting upon rocky uplands, as on the mountain limestone, and most mountain ranges.

"*F. duriuscula.*—In the valleys between such hills, and in the more sheltered pastures of the upland districts.

"*F. rubra.*—In the more sandy loams of the lowland meadow, and by the sea-shore.

"*F. loliacea.*—Rich meadows on river banks, or under irrigation.

"*F. pratensis.*—Best lowland meadows, not liable to floods.

"*F. elatior.*—On sandy clays, or other stiff and strong lands, especially on the sea-shore.

"The *fescues* are invariably present in our best pastures, and especially present in those of the most famous cheese districts.

"The *F. pratensis* is worth $3 33 when timothy is worth $5 per ton. It follows next after meadow foxtail (*alopecurus*) as an early grass, and affords a bite earlier than orchard grass.

"The *Bromus* family has a very bad name, being neither agreeable nor nutritious to cattle. *Bromus erectus* is said to be the only perennial species in the genus. Early mowing is recommended as a means of extirpating this family.

"*Lolium perenne*, or rye grass, is the favorite grass of England, and occupies there the same place that timothy does with us, and is probably better adapted to a wet climate like England than to a dry one like ours. Sixty varieties are cultivated in England of this one species.

"*Lolium Italicum*, Italian rye grass, is worth $2 69 when timothy is worth $5. One hundred pounds of it give twenty-four and a half pounds of dry hay. It is best adapted to limestone and light soils, and is one of the most desirable varieties for irrigated meadows.

"*Triticum repens*, known as 'quack,' 'twitch,' or 'dog' grass, is very easily recognized by its spikelet of eight or ten-awned flowers placed flatwise toward the *sachis*. It is a terrible pest in alternate husbandry, growing in all sorts of soils, and robbing the cultivated plants of the richest portion of their food. In very dry seasons it may be killed by plowing it very thoroughly in July, and sowing the ground with buckwheat. Its stalks sometimes attain an altitude of three feet, but it ordinarily stands two feet high. It forms a tolerably good hay, and is much relished by the stock as a pasture grass. It operates as an emetic on dogs, and is very useful in binding the sloping banks of railroads.

"*Anthoxanthum odoratum*, sweet-scented vernal grass, is not very valuable for hay or for pasture, as one hundred pounds of it gives only nineteen pounds and three quarters of dry hay, and an acre three quarters of a ton. It starts very early in the spring, and continues to throw out leaves during the summer.

"*Glyceria nervata* grows in wet places. Its culms are extremely succulent; it is the hardiest grass in existence, and always grows more vigorously after a severe winter than after a mild one.

Poa serotina, or foul-meadow, is one of the earliest grasses cultivated in this country, and is still among the best. It does not injure by standing, as do other grasses, but may be cut at almost any time. It is easily made into hay, and never seems hard or harsh, and produces sound seeds in great abundance.

"*Trisetum subspicatum* is a mean, stingy grass, growing on stiff clayey side-hills which have a northern aspect. It is only fit to be grown on soils that will bear nothing else.

"*Zigantia aquatica* grows in places wholly covered with water. It is very sweet and nutritious, and cows fed upon it have a copious flow of milk. In favorable situations it produces five or six tuns to the acre. growing to the hight of nine feet. Its seeds resemble rice.

"*Phleum pratensis.*—According to the analysis of Professor Way, timothy yields more dry hay from a given amount of grass, and more of albuminous, fatty, and heat-producing matters, from a given amount of dry hay, than any of the grasses upon which he experimented. But it must be remembered that Professor Way did not analyze either *Poa compressa* or *Poa serotina.*

A crop of pure timothy on the farm of George Geddes, near Syracuse, N. Y., gave three tuns to the acre, and it is reported that John Fisher, Carroll County, Md., cut from an acre five tuns and one thousand six hundred and twenty-two pounds of dry hay.

The proper time for mowing timothy is just when the first dry spot appears above the first joint. If mowed earlier, the plant is injured. If left to a later period, the starch and sugar are converted into indigestible woody fiber, and the nitrogenous compounds, on which its value chiefly depends, are transferred from the leaves and culms to the seed, which mostly drop out before they reach the manger. Timothy is not well adapted to hot sands, gravels, chalks, nor hard, sterile clays; but thrives on peaty, damp soils, and especially on most calcareous loams. where it exhibits its fullest perfection.

"The great drawbacks to its utility as a permanent meadow grass are, the very little after-math it produces, its liability to run out after two or three years, and the injury it receives from insects with which it is infested.

"*Alopecurus* (Meadow Foxtails).—There are five varieties of this genus, viz.: *A. pratensis*, *A. agrestis*, *A. geniculatus*, and *A. ristulatus*. The *A. pratensis* may be distinguished from its allied species by the equality of length in the glumes, and by a twisted arm twice the length of the blossom. It rarely exceeds three feet in length, and does not usually yield over one tun to the acre. It is very watery in its composition; one hundred pounds of the green grass give only nineteen pounds and three quarters of dry hay, while an equal quantity of timothy gives forty-two pounds and three quarters. If one tun of green timothy be worth \$5, the foxtail will be worth \$2 07, if Professor Way's analysis can be relied on. It is found abundantly in some of our best pastures, is one of the earliest to start in the spring, and the first to mature its seeds; its after-math is exceedingly abundant, starting up immediately after mowing, and if the weather be showery, will, in a week or ten days, give a fair bite to the cattle. It is not well adapted to alternate husbandry, as it requires three or four years to bring a meadow to full perfection. It is very difficult to procure good seeds, as many heads are entirely destroyed by the insects. It is better adapted to pasture than to meadow, flourishes most luxuriantly on rich, moist, strong soil, the production from a clayey loam being three fourths greater than from silicious soil.

"*Setaria glauca* is good for nothing in meadows and pastures; it should be exterminated as soon as possible, which may be done by a thin coat of horse manure applied in autumn.

"*Dactylis glomerata*, or orchard grass, sometimes grows five feet high, and has produced five tuns, one thousand eight hundred and fifty-nine pounds to an acre. One hundred pounds of it produces thirty pounds of dry hay; it contains nearly as much of fat and flesh-forming matter as timothy, but contains much less of heat-forming matters. If the latter is worth $5 a ton, orchard grass will be worth $3 59. It flourishes well in shady places, and receives its trivial name from its adaptation to orchards. Its disposition to grow in tussocks may be prevented by harrowing and rolling in the spring. It flourishes well in almost all soils and climates; best in sandy loam. It is known in England as cocksfoot. In this country it is most common in New England, New York, Pennsylvania, and Ohio, and less common in most of the other grass-growing States. We say grass-growing States, for, strictly speaking, the cotton States are not so, notwithstanding the planters are always grumbling about being overrun with grass. It is, however, an annual that troubles them most, and in all those States very little grass seed is sown to produce a crop either for hay or pasture. For both purposes, orchard grass is good, but most especially for pasture, producing good milk, beef, mutton, or wool; and every kind of stock eats it freely, and thrives well upon it; and after being mowed or fed off, it throws up a new growth rather more readily than any other grass. It is not inclined to run out in any situation where it once gets good root, though as easily subdued by plowing as timothy; it is better than that to mix with clover, ripening more nearly at the same time. For pasture, we would mix orchard grass with several other sorts.

"*Poa pratensis* (the Kentucky blue grass) does not grow higher than two and a half feet, and can not be relied upon to yield more than a tun and a half to the acre. One hundred pounds of the grass yields thirty-two pounds of dry hay, and is worth $3 20 per tun when timothy is worth $5. Butter made from this grass will keep sweet longer than that made from any other species. Its after-math is very luxuriant, and it stands the cold better than any other, but is liable to burn up in hot, dry weather. Its favorite locality is a limestone soil.

"*Poa compressa* (wire or blue grass) is believed to be the most nutritive of our grasses; it grows heavy, about twenty inches high, standing thickly on the ground. It causes an abundant flow of very rich milk, and horses fed upon it alone do well. Sheep fatten upon it, and all grazing animals eat it with avidity.

'*Agrestis vulgaris* (red top) grows about two and a half feet long, and yields about one and a half tuns to the acre. It is not a first-rate grass, but seems to be better relished by working oxen than by any other stock. It grows in very moist land.

"*Agrestis alba* (white top) seems better adapted to sandy soils than the preceding, but resembles it very nearly in its botanical character."

No country can be a prosperous agricultural one that imports its hay. Yet we find that South Carolina has done so; not merely from Maine and other Northern States, but from Holland. From a remarkably able report by Oscar M. Lieber, State Geologist of South Carolina, upon "the Agricultural Capacity of the State, and the Obstructions to its Full Development," published in March, 1860, he very plainly shows how a country that neglects grass culture will deteriorate. He points out many instances where the original condition of the soil was very desirable, which is now the reverse, because the owners import hay, and leave their own soil naked. He says:

"There are other considerations, such as thorough manuring, which should be duly remembered; but it is certainly owing, in the very first place, to these causes, that those once fertile lands are now in many instances depopulated and abandoned by their former owners; that a district as prominent in her virgin productiveness as Fairfield is gradually losing her original legislative representation, and that a section of the State, capable of supporting perhaps ten times the population of our entire Commonwealth, is now, to a very considerable extent, thrown out as irreclaimable. But how is the system to be changed? Nothing easier. Clothe your barren hillsides with grass—decrease the area of your cultivated crops—manure highly with commercial and compost manures—and, to enable you to do the latter, keep cattle, sheep, and hogs; feed them well, and make them pay you in rich returns."

812. **Grasses Recommended by the New York State Agricultural Society.**—A committee, composed of Wm. Kelly, J. Delafield, B. P. Johnson, to whom the subject was referred by the New York State Agricultural Society, reports as follows:

"The following described grasses are, by common consent, admitted to be the most valuable now cultivated in England. There are others of great value, which might, perhaps be profitably cultivated in our climate, but for the experiments now proposed, your committee recommend only the varieties here named.

MEADOW FOXTAIL—(*Alopecurus pratensis*).—This is a very early grass, productive, and exceedingly nutritious. It is the principal grass in all rich pastures, is a favorite with sheep and cattle, and is one of the most permanent of the cultivated grasses. The objections to it are these—that it is slow to establish itself and acquire its full growth, and in England does not produce its seed perfectly. Not more than one third of the seed sown usually germinates. In our climate there ought to be no difficulty of this sort.

Meadow Fescue—(*Festuca pratensis*).—Fibrous root. This is one of the most valuable grasses. It is nearly as early as the foxtail, and equally nutritious, though not so productive. It is found in all the richest natural pastures, is much liked by cattle and horses, and is among the most permanent of grasses. It thrives best in the clay districts of England. It ripens its seed well, but, like the meadow foxtail, is slow in arriving at maturity.

Rough Stalked Meadow Grass—(*Poa trivialis*).—This is a superior pasture grass. It has fibrous roots, and in a moist, rich soil is productive and very permanent; but on dry and exposed land its product is inconsiderable, and it soon dies out. It is not remarkable for its nutritive properties, though cattle seem fond of it.

Fertile Meadow Grass—(*Poa fertilis*).—Is a native of Germany; roots slightly creeping; is productive, one of the earliest grasses, and is remarkable for the large crop of after-math, sending up a succession of flowering culms till the frost arrests it. It grows well on any good land, but thrives best in moist ground; is among the most nutritious grasses, and ripens its seed well.

Sweet-scented Vernal Grass—(*Anthoxanthum odoratum*).—This is one of the earliest as well as one of the latest herbage grasses, is extensively cultivated in Eastern Pennsylvania, and imparts the peculiar richness of flavor to Philadelphia butter.

Perennial Rye Grass—(*Lolium perenne*).—The root is fibrous. It is the most generally cultivated of the herbage grasses in England. It is adapted to a wide range of temperature and soils, soon reaches maturity, ripens an abundance of seed, is early and productive, but not particularly nutritious.

Rough Cocksfoot, or Orchard Grass—(*Dactylis glomerata*).—Said to be a native of Virginia, is cultivated with us, but does not rival timothy; yet in England it ranks very high. It is always sown there in mixture with other grasses, and by experiment is the most productive of all, yielding a greater weight of forage per acre, though less nutritious than other favorite sorts.

Meadow Cat's Tail, or Timothy—(*Phleum pratensis*).—The cultivation of it in England is recommended in mixture with other grasses, but not alone, as with us is most common.

Farm, or Bent Grass—American names are Herds-grass, Foul Meadow, and Red Top—(*Agrostis vulgaris*, and *Agrostis stolonifera latifolia*).—In England, several varieties are recognized, the largest of which is Farm, or large leaved creeping Bent; this is more productive, though not so well adapted to upland, as the common Bent Grass, or Herds-grass.

SMOOTH STALKED MEADOW GRASS—American names: Spear Grass, June Grass, and Blue Grass—(*Poa pratensis*).—This grass is indigenous, and is the ordinary growth of our roadsides. It is very early, and continues its growth throughout the season until very late in the autumn; it resists drouth, makes a close sod, and is a great favorite with sheep. As a hay grass, it is not so valuable as many others; it is very permanent.

It is asserted that upward of two hundred varieties of grass are grown in Great Britain, mostly indigenous. In a single sod taken from a rich pasture were found thirty varieties, and there are usually twenty-six or more in all first-rate pasture land.

If we expect to rival natural pastures, we ought to imitate nature in scattering a variety of seeds, instead of confining ourselves to one or two sorts.

813. **George Geddes on Growing Clover.**—"The agriculture of Onondaga County is based on the clover plant, *Trifolium pratense.* It is used for pasture, for hay, and for manure. Strike this plant out of existence, and a revolution would follow that would make it necessary for us to learn everything anew in regard to cultivating our lands. We have this most valuable treasure and appreciate it; its influence and importance to us demand an extended account.

"There are two varieties of red clover, known among the farmers as the large and small. The large is but little cultivated, and is generally considered of less value for hay or pasture, and yields but a single crop of hay in a season; but where wanted for manure only, it is sometimes preferred for its heavy growth.

"Clover seed is usually sown on winter wheat, in March or April, in quantities varying from two to ten quarts to the acre : eight quarts is generally sown by the best farmers. Sometimes this seed is sown on oats, barley, and spring wheat; but as it can be sown before the spring frosts are over on winter wheat, it is more certain to be covered by the freezing and thawing of the earth, and for this reason success is more certain than with any other crop.

"Gypsum, at the rate of a bushel or more per acre, is usually sown after the ground is settled and the crop has commenced growing. Sometimes the sowing of the gypsum is deferred until the wheat is harvested, and then sown on the stubble as soon as convenient. If the season is wet, and therefore a growing one, the small kind of clover will be in full bloom before the frosts of autumn kill the plants.

"It is common to pasture this young clover moderately in autumn, and opinions are somewhat divided as to whether this injures the future growth of the crop.

"In the following spring, gypsum should be again sown on the clover, at the rate of a bushel to the acre. By the 25th of June or the 1st of July the small variety is ready for making into hay, and should yield a tun and a half to the acre. Various opinions have been entertained as to the proper stage for cutting this hay crop; but the general practice is to cut when in full bloom, or as soon as the earliest heads show signs of ripening. The true process of curing is to handle as little as possible, and to cure mostly in the cock. As soon as the hay is drawn away, gypsum, at the rate of a bushel to the acre, should be sown. By about the first of October the second crop will be ready to cut for seed. This crop should be allowed to ripen so that the seeds are full and mostly hardened; and should be carefully cured, or it will heat in the mow to the injury of the seed. In winter, the seed is thrashed out at a cost of about one dollar a bushel. The straw and chaff are eaten with avidity by cattle and sheep, and are of considerable value for forage—perhaps enough to pay for cutting, curing, and putting the crop in the barn. The seed generally averages three bushels to the acre —sometimes six bushels have been saved—and sometimes the crop of seed is a failure. The usual market price is about six dollars a bushel.

"After the seed crop is removed from the ground, there is a considerable part of the crop of hay left, particularly if it was cut high, as it should be. This stubble is usually pastured to some extent.

"In the spring following, the ground is plowed, unless wanted for pasture. If plowed, corn, oats, barley, or spring wheat is sown, and a good crop is confidently expected. If it is intended that the clover shall remain on the ground more than one year, other seeds are sown with the wheat so as to make a more perfect covering of grass, and aid in filling the soil with roots. Timothy (herds-grass), *Phleum pratense*, sown in September with the wheat, will aid in every part of the cultivation of the clover. The crop of hay will be benefited, and the surface of the ground will be more perfectly covered, and thus weeds kept out, and in case the second year is to be for pasture, it is important.

"According to Boussingault, one acre of the perfectly dry roots of clover will weigh 1,275 lbs., and these roots are valuable manure for the next crop, and the same may be said of the tops that are plowed under. The roots run deep into the soil, and thus pulverize it, so that a single perfect plowing brings it into a most satisfactory condition. Some of our best farmers plow their fields once in a few years, and then shallower plowing of this clover sod will show the long tap roots that have been pulled up from the subsoil by the plow, projecting above the surface all over the field, looking quite like dead weeds. These roots have transferred the fertilizing matters of the lower soil to the surface.

"If our soils require improving we turn the clover crop under, and repeat the operation until there is sufficient fertility to allow us to carry the clover off. The oftener we can fill the soil with roots, and then plow them under, and thus allow them to rot, the sooner we expect to get our land in condition to crop with grain.

"A very considerable part of the cultivated land of this county has never had any other manuring than this clover and gypsum, and its fertility is not diminishing. Fields that are distant from barn-yard manure are rarely treated to anything but gypsum and clover. These fields are not cropped with grain as often as those that have the benefit of barn-yard manure, but they are manured at much less expense.

The cost of	a fourth of a bushel of clover seed, at $6, is	$1 50
do.	sowing is about	08
do.	three bushels of gypsum at the mills is	24
do.	drawing same	12
do.	sowing at three different times	38
Total cost of manuring one acre with clover		$2 32

"A field treated as described, having the first year given a crop of hay and another of seed; the second year, an acre will nearly or quite pasture a cow from the 20th of May until the middle of August. If then plowed six or eight inches deep in the most perfect manner, it will be in the best possible condition for winter wheat; or if not wanted for wheat, the land may be used the second year for pasture the whole season, and put into corn or any other crop the next. Clover is a biennial, and two years is all that one seeding should stand."

814. **Clover Seed—How Much to Sow per Acre.**—John Johnson, "the old Scotch farmer" near Geneva, N. Y., says: "I never have sown over twelve pounds of clover seed to the acre, unless done by mistake, and I have always had large crops if any one else had in the neighborhood. My man once accidentally sowed, by the use of a machine, twenty-four quarts per acre of clover seed. The result was, the clover never got taller than the natural white clover we some seasons have in such quantities, but which is generally too short to cut; while that sown at about 10 lbs. to the acre was as good as I could wish."

Robert L. Pell, of Ulster County, N. Y., once stated that he generally sowed a bushel of clover seed per acre. Upon this Mr. Johnson remarks: "I read that Mr. Pell sows one bushel of red clover seed to the acre. Now such nonsense as this should not go out among farmers, a great many of whom are opposed to anything like book farming; and when they see a record of such folly, it is less wonder that they should believe nothing that is written on agriculture further than their own practice."

The statement was, like many others, made without proper consideration, and liable to mislead others. The quantity named by Mr. Johnson is correct. Can any one tell the true value of an acre of clover, and whether it is worth more to plow in than it is to rot upon the ground, or cut and cure and pass through animals, before it is given back to the earth as manure? And who can tell the value of a tun of manure; that is, as a smelter of ore can tell the value of a tun of it which he puts into the furnace? Does not the farmer put the manure into the earth for a similar purpose? One draws out refined metal, and if that is worth more than the ore and fuel and labor, then he makes a profit.

The other has for an object to change the mass of dirt into corn, wheat, and fine flour, which, after all, is nothing but refined dirt, and upon the process depends the profit, and one should be just as well able as the other to tell the value of the crude article.

815. **Growing Clover Seed.**—Clover will produce only one crop of seed in a season, and if we allow it to grow until it has blossomed, and then permit it to stand until the seed begins to form, or until the seed has formed, and some of the blossoms begin to turn brown, we can not reasonably expect to have much of a crop of seed the next time the clover is cut, because the seed-producing substances have been too much exhausted to mature another crop the same season. There is usually too much anxiety to get a good crop of hay, and afterward a crop of seed. It is better to be contented with less hay in the first crop, and have more seed in the second crop, than to lose a dollar's worth of seed for a dime's worth of hay.

It is said that the application of plaster to the clover field in spring will secure a better yield of seed from the second crop, while a direct application after mowing the first growth is found to increase the rankness of the hay at the expense of the filling of the heads with seed.

816. **Harvesting Clover Seed.**—We recommend cutting when two thirds of the head are brown. The chance of good weather is better, and there is less loss from shelling while handling; and the straw is of greater value as fodder than if allowed to stand until the whole is dead ripe. Besides, the later ripening heads are poorly filled with seed. Sometimes, however, both the first and second growth may blossom largely and yet produce very little seed—from some cause not well understood.

The best implement for harvesting is a reaper—the grain platform attached, with a board at the back edge to retain a larger amount of clover—when full, to be pitched or raked off in heaps. If clover stands well, it may be cut high; it saves time in curing and labor in handling, and leaves the dryer portions of the stalk upon the field. As soon as fairly dry it should be drawn to the barn, as it can not be secured in the cock against rain. When spread out, however, as when left in the swath, or in small gavels from the reaper, it is little injured by rain, though heavy storms may wash off a portion of the seed.

In cutting with the scythe, we may turn two swaths together to facilitate the work of raking. With good weather it will be cured sufficiently to draw in the second day after cutting; if not, it may be raked, when slightly damp, into small bunches, or pitched together with a barley-fork. Care in handling is requisite to prevent loss from the dropping of the heads, and, from the stiff bush-like character of the straw, it may be placed in the mow in a greener state than hay or grain, without injury. The moisture should be dried off, but an occasional juicy stalk will do no harm.

The seed can be separated from the straw with a common thrashing machine cylinder, having a long shaker or box full of holes attached, so that the heavier part of the chaff, which contains the seed, may fall through. This work is best performed in freezing cold weather, when no dampness is present in the seed or air. To get the clean seed, a clover-huller is employed—a machine which rubs the seed from the chaff, which is passed through it again and again, until the separation is complete. Wherever the crop is much grown, there are farmers who make it their business to go from barn to barn with these machines—thrashing, hulling, and cleaning the seed at a specified price per bushel, usually about one dollar.

If grown only in small quantities for home use, clover seed may be thrashed with flails or trodden out with horses and sown in the chaff, which is full as certain to catch, and perhaps more sure than that cleaned ever so nicely. Still it is difficult to regulate the quantity as closely, or distribute as evenly, as with the clean seed.

817. **Cutting Clover for Hay.**—Clover for hay should be cut when the heads are about two thirds open, and it may be housed the same day, and salted with a peck to the tun, and will keep perfectly sweet, though sweating and turning almost black. We prefer to cock clover to cure, covering it with hay caps in case of danger of rain. The value of a crop of clover for hay is esteemed great by all farmers, and some have learned to value it higher for improving the soil for future crops than they do for hay. One advantage over any other crop grown to improve the soil is that its roots are earth-workers, and when they decay, they not only manure the soil, but leave it light and porous. It is a question well worth the consideration of farmers, where clover grows heavy, so as to effectually shade the land, how much is lost by not plowing under while green. Some suppose that the shade, together with the mold of the clover on top of the ground, would improve the land as much as plowing under. Others think the benefit pretty much lost, and others still would consider it a dead loss to devote a crop of clover to manurial purposes. They will cut it for hay, haul it home, and haul the manure back again.

White Clover is seldom cut for hay. Its greatest purpose is for pasture. Its growth should be encouraged by all who keep bees—it is good bee-pasture. The growth of white clover on soils natural to its production may be encouraged and promoted by a top-dressing of plaster and ashes.

818. **Lucern, Alfalfa, Lupine, etc.**—Several of the plants named in this paragraph are used for forage, though not properly called grasses. They are worthy of farmers' attention.

Medicago sativa (lucern) succeeds best upon limestone loam. It is particularly liable to be injuriously affected by weeds, to avoid which it is generally sown in drills, and hand hoed in England, where its cultivation has been mostly in small patches for soiling, for which it is very valuable. Mr. Gould says:

"The best soil for it is a sandy one, resting on a porous calcareous subsoil. Its roots penetrate fourteen feet in depth, and hence a hard subsoil is fatal to successful growth. It arrives at its greatest perfection after three years. In one recorded case, eleven acres sufficed to keep eleven horses two hundred and ninety-nine days. In another, a field of eight acres kept eight horses three hundred and fifteen days. In both cases a large number of sheep were fed on the ground after the last cutting for the horses. Chancellor Livingston, in Columbia County, N. Y., cut twenty-five tuns from an acre in five mowings. It is ready for cutting about the first of May, and may be cut over every thirty days thereafter. It is remarkably adapted for milch cows, where the milk is sold in the market, but butter made from it is not so sweet as from other grasses. It is greatly relished by horses and cattle; one hundred pounds of it will make twenty-five pounds of dry hay, and its nutritive powers bear such a relation to those of timothy, that it is worth $3 13 per tun where that grass is worth $5. The only difficulty with lucern is to get it started. It must be sown in drills, and carefully hoed until it is large enough to cover the ground. If this precaution is taken, and a drouth does not occur just as the young plants are starting, it will be pretty sure to succeed, and will last for twenty-five or thirty years. If, however, it is overrun with weeds in the beginning, or a severe drouth occurs, it grows feebly, and soon dies out. The seed is covered with a very hard and compact coat, which, if the weather be dry, will greatly retard vegetation. It is therefore generally the practice to steep it in warm water, to soften the coat, for six or eight hours before sowing. From fourteen to eighteen pounds of seeds are usually sown on an acre; but, as many of the seeds are imperfect, and as fine and succulent plants are more desirable than coarse and rank ones, it is better economy to sow twenty-five pounds."

Alfalfa, sometimes called Peruvian clover, is beginning to be appreciated in California. It can be cut several times a year, and afford a very heavy crop. In deep soil the roots penetrate so far that drouth does not prevent its growth, like ordinary grass or English clover. It should be cultivated here for soiling cattle.

Lotus corniculatus (bird's-foot trefoil) is a prostrate perennial, common on open grassy pastures and dry places. It is a leguminous plant, equally nutritious as clover, and is instantly eaten down whenever cattle have access to it. It is one of the commonly cultivated artificial grasses of England, and is always recommended as worthy a place in all mixtures for permanent pastures, and especially for lawns, orchards, and shady places.

Medicago lupulina is another leguminous plant, a fibrous-rooted perennial, very common in dry pastures, especially if of good loamy quality, where it forms, with other plants, a thick sward. The pods are short, black, twisted, and arrayed in oblong heads. It is not equal in nutritious qualities, perhaps, to red clover, but is valuable on dry, poor soils, where, however, it is apt to run out in a few years.

White lupine is highly recommended as a fertilizing crop on sandy land, where no other crop would grow. Portugal has been highly benefited by growing lupine for soiling and manuring. It is of very rapid growth, produces a large amount of vegetable matter, and draws from the subsoil a large quantity of alkalies. It is rarely or never injured by drouth or insects, and is admirably adapted for enriching unfruitful sandy soils, while its strong stems and roots open and ameliorate, as well as enrich, heavy tenacious clays. M. Vilmorin, of Paris, says it is sown in that vicinity about the middle of April, after all danger from frost is past. He says the green manure yielded by this plant is excellent. The seeds, soaked in water, form a good cattle food, and the young plant is readily eaten by sheep.

Spergula Arvensis (Spurry).—No plant has been more lauded for enriching sandy soils than spurry. Von Vogt states that by its use the worst shifting sands may be made to yield remunerative crops.

Vicia Sativa (Vetch or Tare).—In England this is an exceedingly valuable plant, especially on heavy soils. It can be sown in autumn or spring—the latter generally yielding the heaviest crop, though the former is the earliest. Vetches are principally used as a green food for horses; an acre of good vetches, fed in the yard or stable, will keep more horses than six acres of the best pasturage. They succeed best in a wet season, and on this account are not likely to do well in this country, though we have seen them in Canada, and sheep and horses both fatten upon vetches faster than upon clover. They are good, too, for all horned cattle, particularly milch cows. Pigs eat vetches as well as clover, and thrive without grain. Mr. Lawes' experiments on vetches, extending over many years, prove that, like peas and beans and clover, vetches are an enriching rather than an impoverishing crop.

Barn Grass.—The editor of the *Maine Farmer* thinks that very common plant in New England, known as barn grass, would prove as profitable for cultivation in that section as Hungarian grass of Iowa notoriety, which it very much resembles. Both are annuals, and if grown upon a good corn soil will produce a heavy crop of green or dry feed, but no grazing after being mowed. We have never considered the barn grass a valuable forage plant, and do not believe it will ever come into general use, because Indian cornstalks are more nutritious, and will produce more per acre when sowed in drills or broadcast. In a dry season, and on good soil, it will produce more than most of the grasses that we cultivate. Horses and cattle like it when the seed is in the milk. Horses and poultry like the seeds. There is as much farinaceous matter in the seeds, in proportion to the size and weight, as in some of the cultivated grains.

819. **Hungarian Grass.**—This is a new name for an old thing. It was introduced into France in 1815, and has met with much favor. It germinates readily, withstands drouth to a remarkable degree, remaining green even when other vegetation is parched up, and if its development be arrested by dry weather, the least rain restores it to vigor. It has numerous broad and long leaves, so that it affords a great amount of nutrition for stock.

According to Mr. Flint, Hungarian grass flourishes in somewhat light and dry soils, though it attains its greatest luxuriance in soils of medium consistency, well manured. One of its characteristics will go far toward recommending it to farmers. Mr. Cornell says that one piece of his was blown down by storms three times in succession, and each time recovered its upright growth. He thinks it twice as heavy as timothy. On poor soil it attained a hight of two and a half feet, but on a small patch, more highly manured, it grew to even three and a half feet. This grass is a good forage crop on the rich lands of the West. It will exhaust soil, and if it is not rich it will not produce a profitable crop. The time of sowing is the same as that of oats. We would use a peck of seed per acre, and cut for hay before the seed is in the milk. It should be cured like timothy, and stock will eat it as well—many say better. The Hungarian grass is millet. Whether precisely the old German millet or not, which has long been cultivated in this country, is no matter. It is, at least for the prairie farmers, a good crop plant. The sellers of "honey blade grass seed" are knaves of the meanest sort, when representing the seed they sell as anything but millet, and millet is no new thing in this country. In some situations it certainly is a good thing, and we hope its cultivation will rapidly increase, but we object to humbugging anybody into it under the impression that they have found a new variety of grass, under the name of "Hungarian."

A farmer in Illinois says: "As a forage plant for milch cows and cattle it is, I believe, an excellent article, when sown thick and not allowed to ripen the seed, or to feed after the seed is thrashed out. For horses, it will not do to feed with seed. Where it does not produce death it reduces the animal's strength, though not always his condition as to fat or lean. From feeding with this grass I have lost three horses. The seed is to horses a stimulating diuretic, acting upon the kidneys energetically; and when used continually, the increased diuresis produces irritation and inflammation of the kidneys, weakness of the loins, shortness of breath, inability to undergo much exertion, and death ensues, unless the cause is removed and remedied. I do not think it too rich a food, but the oil contained in the seeds is injurious. It operates upon cattle also as a diuretic, and rather more so than I like in milch cows, unless fed upon shorts or bran at the same time. My opinion is that the straw is a good feed when not too coarse, but with the seed, injurious to horses and sometimes to cattle. In one experiment made with Hungarian grass upon two acres, the seed, sown the first of July, ripened before frost, and two tuns of hay per acre were cut. A third of a bushel of seed sown broadcast suffices for an acre."

The *Northwestern Farmer* says: "It is well known to those who have fed the Hungarian grass, that it is remarkably nutritious, and that horses and other stock thrive more rapidly when fed on it than when fed on any other kind of coarse forage. Hence it should be fed more sparingly. If any injury has resulted from feeding it as stated, it can only be accounted for in the action of the seed upon the animal organism. The seed is as rich as Indian corn, and should be fed with care, as horses are liable to eat too much."

One farmer says of it: "I have been told that it is not safe to feed to my horses, as it would obstruct the flow of urine. My opinion is the reverse. I think it somewhat diuretic and aperient, especially for animals that are worked hard.

"If I have a horse, colt, cow, or calf that appears unwell, I feed Hungarian hay as a remedial agent, and have been gratified upon all such trials to see how soon the animal would begin to gain. I consider it the best hay we can have, if fed properly. I would say, never confine your working horses to this hay alone, but alternate with prairie hay or some other kind. If fed in mangers in tight stables, a dust arises from it that will make horses cough."

From all we have learned by our own experience and that of others, we can not commend its cultivation to farmers in the Eastern States; and this we find to be the opinion of many others. We have, however, one correspondent at Bristol, Addison County, Vt., who is jubilant over his success in growing Hungarian grass—two tuns of dry grass and nearly twenty-five bushels of seed from four quarts sown. He says: "It is a very nutritious and sweet grass, and a great favorite with horses and cattle. Sowed June 1, it matured by August 1, standing dry weather well. The average yield is said to be six tuns of dry grass and thirty bushels of seed per acre. The stalk is finer than timothy of the same length, with fine, succulent leaves. It forms a large stool from a single seed, and, although an annual, will pay better than most of the perennial grasses, as the hay is good when mature enough to ripen its seed, which is as valuable as oats."

The following statement about Hungarian grass is from the *Genesee Farmer*, the editor of which, we believe, would not say a word for or against it which he did not believe to be strictly true. As he is a man of scientific acquirements, his statement that it is nearly or quite identical with the common millet, may be accepted without hesitation. He says:

"This grass has attracted a large share of attention at the West, where it has supplied, to a great extent, the place of timothy grass, which it is difficult to grow on account of winter-killing. It is nearly or quite identical with the common millet, *Setaria Germanica*, growing, perhaps, not quite as large straw, and a trifle smaller seed, or about the same as millet, on rather poor soil, sowed quite thick. That it is valuable as a forage plant, all know who have ever grown the millet to any extent; and to the farmers at the West it has been a great boon, from its quick and luxuriant growth. It is an annual, thriving best on warm, rich, sandy soil, and may safely be calculated to yield from two to three tuns of cured hay, which horses and cattle prefer to the best timothy. To be obtained in the best form of hay, it should be cut as soon as the seeds on the tops of the stalks begin to turn, and before the bulk of them are ripe. We commend it, either as Hungarian grass or millet, to the attention of farmers, not for making their fortunes, but as an excellent auxiliary as food for farm stock. This is the testimony of farmers in Monroe County, N. Y., who have grown it, and have no seed to sell, either as millet, Hungarian grass, or honey blade grass."

820. **How Much Grass Seed per Acre?**—The answer to this question would vary in almost every neighborhood. To answer it understandingly, we must know the number of seeds contained in a pound or in a bushel.

A table, in an English work, gives the following calculation of several kinds of seed:

	Seeds per lb.	lbs. per bus.		Seeds per lb.	lbs. per bus
Italian rye grass contains...	270,000	18	Swedish turnip............	154,000	54
Red clover....	250,000	60	Buckwheat...............	26,000	54
White clover..............	687,000	61	Rye......................	22,000	56
Sweet vernal grass.........	925,000	10	Barley.....................	15,000	60
Drumhead cabbage........	112,000	52	Wheat.....................	11,000	60
Scotch drumhead..........	127,000	55	Oats.......................	21,000	32

An important condition to the healthy germination of all seeds is, that they should have become perfectly ripened before being collected.

Another condition is, that they should not be sown too early in the spring, as no seed has ever been known to germinate below the freezing-point.

It is of the first importance in raising any kind of crops, that the seed sown should be perfectly good, fresh, and thoroughly ripened. It is generally kept in shops for so great a length of time that it is often in a state unfit for vegetating when purchased by the farmer.

In rich, well-disintegrated soils, every good seed grows, while in poor, badly tilled soils, be the seed ever so good, half of them will fail, particularly in dry seasons, and a third of those that come up will die afterward.

Rich soils are supposed to require a smaller number of seeds than poor soils, as in the rich earth they have a much better chance of growing and becoming luxuriant, thus individually occupying greater space.

In deciding upon the proper quantity of seed to be sown, the farmer must consider whether the season is favorable or not, or he may meet with serious loss. Our opinion favors a very liberal seeding of grass and clover. Timothy, say twelve quarts sown with winter grain in the autumn, to which add 10 lbs. of clover in the spring. It is a good plan to sow it on the last snow. Red-top seed is sown in the chaff, three bushels per acre. Orchard grass in the chaff, one and a half to two bushels. It is good economy to sow grass seed and clover with every crop of small grain. The growth of only a few months, say from the harvest of winter grain till time to plow for Indian corn, makes a great deal of manure for the next crop. As a rule, never leave the earth naked.

The globe is a mass of vegetable life. Plants are the universal covering—the dress of the naked earth. Their functions are to reclaim naked, barren spots, and improve all its surface. They are the basis of animal life and existence; their very beauty, their social and benevolent language, render even this troubled scene a place of delight. He who communes and meditates among trees and flowers shall find his Maker there to teach his listening heart.

821. **Seeding Grain Land with Grass.**—If a field of wheat is well harrowed in, and the ground is fresh, it may be sown with timothy without doing anything further; the first shower will cover the seed sufficiently. If the surface is not entirely smooth, it will pay to drag over it a large bush when the grass seed is sown. Some land that is pretty wet is apt to send the timothy ahead of the wheat in the spring, and injure the crop. Such land had best not be sown till spring. It is a good plan to sow upon a light snow, if there is one at the right time. When it melts, the grass seed will be sufficiently covered. If there is not a snow, or if the land is dry, the grass seed may be

sown in March, and lightly harrowed or bushed in without any harm to the wheat. If wheat land is to be seeded to clover, we would mix the seed with plaster, and sow it in March or Aprii, without harrowing. The quantity of timothy or clover seed per acre varies from four to eight quarts, and plaster from half a bushel to two bushels. In sowing grass or clover seed upon oat ground, care should be taken to sow it directly after the oats, while the ground is fresh; and it will be an advantage to roll the land, or drag it with a bush. There is no method of manuring land so cheaply as sowing grass or clover seed, and turning in the sod with a Michigan plow for a hoed crop.

The foundation of all good husbandry upon any farm not devoted to some special crop, as cotton, sugar, rice, fruit, is an abundance of grass. And this grass, either as grazing or winter keeping, must be fed on the farm to domestic animals. It can not be sold off without endangering the fertility of the land. Every Northern farmer who would be successful, must devote his energies to making his farm productive in grass.

822. **Seeding Indian Corn Land with Grass.**—It is not uncommon in some places to seed corn-land with some sort of small grain, not so much for the crop as to protect the grass or clover with which it is desirable to seed the land. Sometimes corn-ground is put in small grain at considerable trouble, for the purpose of seeding it to grass or clover, the grain crop not being considered an object, as it is, compared with other crops, not a profitable one. We presume such farmers never think, because they never heard, that they could just as well sow their grass seed among the Indian corn as among the wheat or rye stalks, and that one would serve as a shade for the young plants just as well as the other.

Where it is intended to seed corn-land, care must be taken in the last working of it to leave the surface as level and smooth as possible; then sow the seed and harrow with a light, fine-toothed one-horse harrow both ways, or else rake between the hills where the harrow teeth do not touch, with an iron-toothed hand-rake.

If the stalks are cut above the ears, in the way common in all the Eastern States, we would pluck the ears when ripe, and leave the but-stalks standing till spring, and then roll them down. If the corn is cut up by the ground, the stubs may be rolled or beaten down in the spring; and if there are any spots where the grass seed did not take well, they may be re-sown and harrowed, raked or bushed.

There is probably no way in which land can be cheaper or better seeded than by sowing the seed among corn; and a good mixture will be found to be composed—of clover, five pounds; red-top, one peck; timothy, one and a half pecks per acre; and if for pasture, we would add four or six quarts of orchard grass, and we would not take any pains to level the surface. In the spring we would sow at least a bushel of plaster per acre, and we are sure that the change from corn to grass will be quicker, easier, and more certain in this way than in any other.

An Illinois farmer gives his experience in seeding corn-land as follows: "The men were set to work about the middle of August, or a little before, with garden rakes to smooth the rough places and prepare the ground for seed. We then sowed liberally with timothy. We cut the corn up at the ground as usual. In the spring we rolled the ground while rather soft, and have seldom had fields left in smoother and better condition for the mowing machine. The seed took remarkably well, and produced the next year a fine crop of excellent hay."

Farmers need not fear to sow grass seed and plow it in among corn. Some farmers of our acquaintance have tried the experiment of plowing it in, and are convinced it is the best way of planting. It is contended that where it is deeply buried it will vegetate and find its way to the surface in time, and having roots deep set it withstands the drouth better than it does when sown upon the surface or only slightly covered; and, besides, it is not so likely to heave out.

One man says: "I have practiced sowing grass seed and plowing it in for twelve years, and I have sown on five different farms in this way, and on every variety of soil, from gravelly ledge to black muck, and never failed to get a fair crop of grass when seeded in this way."

823. **Sowing Grass Seed in Autumn.**—P. Morrill, in the *Maine Farmer*, offers the following reasons for sowing grass after harvesting the grain crop, instead of with it in the spring:

"Grass seed should be sown in autumn, because it is the natural time, as much so as winter rye or wheat. By turning under stubble for sowing grass seed, you give it the clean possession of land. If sown with grain in the spring, the tender grass plants are crowded by grain and weeds above, and their roots below, and for three months they have a hard struggle for life in the shade. All plants derive the chief part of their bulk and value through their leaves, and in harvesting the grain by mowing the grass-leaves are nearly all cut off, leaving the bare stalk suddenly exposed to the scorching, withering rays of the sun. I plow the land just deep enough to cover the stubble completely, harrow with a light harrow, then sow the grass seed, and brush it in thoroughly."

Another farmer says: "The best way I have found to raise good timothy is to get your ground in good order, the same as you would for wheat, and harrow very fine, and then the beginning of September sow one bushel of timothy seed to four or five acres, and give a light harrowing after."

A writer from Buchanan County, Iowa, says that he prepared ground in September, harrowed and sowed six quarts of timothy seed per acre in March, and from nine acres made twenty tuns of good hay in July.

Another says: "I would always sow timothy in autumn, and I have had considerable experience in sowing and raising grass, especially timothy, and have always found where I sowed a peck to the acre, the grass was sufficiently thick, and sometimes too thick, and have come to the conclusion that one bushel sown to five acres is nearer the proper quantity."

824. **Seeding Prairie Sloughs to Red-Top.**—An old farmer of Cedar County, Iowa, wants us to advise all prairie farmers to turn their sloughs into red-top, as it is a much more valuable crop than the natural growth. He says:

"As soon as the ground thaws enough in the spring sow your seed, say one bushel to six acres, and harrow well to cut the sward, so that it will take root and grow. Then mow it before harvest, so as to give it a chance by the aid of autumn rains. If left too late, the wild grass will smother it out. Do not be discouraged if it does not head out the next year, but mow as before, and ever after you may look for an unfailing crop—say two or three tuns per acre. When there is plow-land on either side it can be got in around the edges without the use of the harrow, as the wash will spread over so that it will take root. I choose this method in preference to breaking. Some prefer ditching, but this is an error. Only where the water remains during the whole year is ditching necessary. For pasture, one acre of red-top is worth three of the slough grass."

In many places, particularly in Northern Indiana, there is a native red-top grass that is equal to anything of the name for hay for all kinds of stock. No doubt that could be extended by cultivation upon the plan above recommended, which we know is a good one.

825. **A Cheap and Speedy Way to set a Grass Plat.**—A lady gives the following plan: "At different times during last season, in improving the grounds about the homestead, we had occasion to sod several pieces, but no rich, thick-set grounds were convenient where we could procure the turf entire; we therefore adopted another plan. We procured less perfect sods, cut without care, and threw them into the cart promiscuously; and after plowing the ground well to receive them, we chopped them up into small pieces, say from one to two inches across, more or less, and worked these under the surface, barely covering the roots. After the first rain, these small pieces of turf sent up numerous blades, and in a short time the ground became entirely covered with grass. These experiments were tried several times from July till September, and always with perfect success, though of course the latest planting did not become so thickly set before cold weather set in."

In all ordinary cases we should prefer this method to entire sodding, even if turf was at hand, on account of the saving of time and expense. Blue-grass roots are very tenacious of life, and when scattered in the way above named, so as to cover one quarter of the ground, will soon spread so as to make a thick-set lawn.

826. **The Way to Harvest Timothy Seed.**—If the timothy is very tall, and not too heavy, cut it with a grain-cradle, as high as practicable, and after it is raked and bound, set it up in long shocks, to cure about three or four days—then it is hauled to the barn. Then cut the stubble close to the ground for hay. Sometimes when the bottom of the grass is not very thick, cut it with a machine close to the ground, and leave it in small gavels for a

day or two, if the weather is favorable for hay-making; then turn them over, stir them up a little, and bind, and when cured, haul to the barn, and spread over a large surface, so as not to injure the vitality of the seed.

Another way is to mow the grass with a scythe as soon as the seed is ripe enough, and allow it to remain about one day in the swath; and the next day, turn the swaths upside down. Should there be some very thick, green bunches, they should be stirred up, so that the whole would dry out in a day or so if the weather is favorable. As soon as it is cured, we would bind in small bundles, and shock it, and allow it to cure for several days, when it may be stacked or put in the barn. Most farmers allow their seed to remain too long in the field after it is cut.

In mowing timothy grass for seed, it is very desirable to have it all laid evenly and straight, as if it had been cradled, so that we can bind it. In order to do this properly, a man must be not only a good mower, but he must have the knack of fetching his scythe around at every clip in such a manner that his swath will not be tumbled over and over, as it sometimes is when we mow grass for hay. It is almost impossible to give the necessary directions on paper how to do it; but, in the first place, it is very important to point in low. This must be done by dropping the entire scythe, from heel to point, flat on the ground, and keeping the heel down on the ground through the entire clip or sweep.

827. **Notes on Meadows and Pastures.**—The following excellent article is from the pen of Professor Buckman, of England:

"Plants are weeds in pastures, if they do not add to the crop either of grass or hay. The following plants take up spaces, but yield no produce. That is: Broad-leaved plantain (*Plantago media*); Dandelion (*Leontodon taraxacum*) Daisy; (*Bellis perennis*). The leaves of these grow too close to the ground to be eaten off by cattle or be cut by the scythe.

"Cowslip (*Primula veris*); Primrose (*Primula vulgaris*); Green-winged orchis (*Orchis morio*); Early purple orchis (*Orchis masculo*). These take up room in growing, are not eaten by cattle, and being dead before hay-making, add little or nothing to the rick.

"We have just been examining a pasture full of the first three species of the above list. Of the plantain we made out as many as twenty-five in the square yard, varying from two to six inches across; we removed them, and bare patches to the extent of a quarter of the surface was the result. Of the dandelion we have as many as six tufts in the square yard, each more than half a foot across: we remove them, and in so doing have sown some hundreds of flying seeds over the rest of this field, or sent them to our neighbor. And now for the 'wee, modest, crimson-tipped flower,' looking so bright with its silvery stars dotting the green field, surely this is not a weed? Alas! yes, all is not gold that glitters, or silver that is bright, and on the spot where the daisy is growing, a grass root is not, and we have just stepped out to look at a meadow half daisies. However, as regards these three plants, there is no doubt that the first two are the most mischievous, and the question of how to keep plantains and dandelions out of the pastures, and still more out of lawns, is one worth more attention than has yet been given to it. With respect to the plantain, we know of no better method than absolutely cutting them up with a common knife and dropping a bit of salt in each hole, as without this they sprout up again from any part of the old crown that might be left in.

"Mr. Baily Denton invented an implement for this kind of weed destruction, which would eject a caustic fluid as it cut up the plants, and he named it the scorpion spud. A boy with a knife can easily clean pastures very foul with plantain and dandelions, at one shilling an acre, a cost which would be amply covered by the first hay crop, for it would, indeed, be a comparatively small admixture of plantain that did not take up the space that would grow a hundred weight of hay.

"As regards seeds for laying down permanent pasture, care should always be exercised to prevent this plant from being sown, as a few seeds will soon stock the ground; and if the new pasture is left pretty much to itself, for some two or three years the plantains will increase very rapidly. It should be considered that a single root may in one year produce from three to six thousand seeds.

"Care should be taken to prevent the seeding of dandelions in waysides and waste places, as each flower-head may produce one hundred and seventy seeds and twelve heads to a single root at one time, and they keep on forming for several months; it is indeed of consequence always to prevent, if possible, all weeds from seeding.

"'One year's seeding, seven years' weeding.

"There are many other plants in meadows that die out before grass-cutting; but still, as they grow with the grass, and take up space at the most critical time, as far as yield is concerned, they are very detrimental, and to its hindrance; they are, besides, evidence of poverty and bad management, which only exists in bad grass-farming. Cultivate on proper principles a meadow in which they occur, and the amount of success will be indicated by their more or less rapid decrease.

"Plants which, though innocuous, yet take up space, and so dilute the quality of the hay and injure the productiveness of the pasturage, are named below. This offers a somewhat large list, as all the plants found in pastures, which have a tall growth, have neither spines nor other mechanical hindrances, nor any poisonous qualities, must be ranged under this head. These are injurious, simply because they take up space which might be better appropriated to the growth of grass or some nutritious herbage; for, as they have no qualities to cause them to be eaten by cattle, so in the hay they do not nourish but simply dilute the bulk.

"Blunt-leaved dock (*Rumex obtusifolius*); Crisp-leaved dock (*Rumex crispus*); Marsh dock (*Rumex palustris*). All three are rather common meadow plants, especially in damp places.

"Burdock (*Arctium lappa*). Often found in the borders of fields.

"Butter burr (*Petusites vulgaris*). Occupies the sides of water-courses.

"Cow parsnep (*Heracleum sphondylium*); Wild-beaked parsley (*Anthriscus vulgaris*). These two umbelliferæ are very common, and most unsightly.

"Ladies'-smock (*Cardamine pratensis*), found in wet meadows, and Common yellow rattle (*Rhinanthus crista galli*) in very poor meadows, and the Hawk-weeds and others (the several *Compositæ*), everywhere.

"These, though only offered by way of examples, yet in themselves make up a formidable list of plants injurious to the pasture. Their large roots and tall stems take up much space to the injury of the grass; and though it is quite true that they go far in making up weight in the trusses of hay, yet the hay will always be of an inferior description; and in fields where plants of this character prevail we shall often have a good pasturage for cattle—that is, the animals will get on well on the grasses, of which only they will partake; and then one is too apt to be astonished that good feeding meadows should yield a poor hay; but the truth is that hay, with a fourth of its bulk and weight of these objectionable plants, is diluted to that extent by rubbish with no feeding qualities, and well indeed is it if they do not many of them contain positively injurious principles.

"How, then, are we to get rid of these pests? The simplest answer, with regard to the docks and umbelliferæ, will be—Let them get tolerably strong in their stalks, and then take the opportunity, when the ground is soft, to pull them out of the land. They must not be mown, as in this way small branches, or buds that will make branches, will seed before the summer is over, and then fifty new plants will appear for one old one that we have destroyed; but by pulling, we take out the crown, and usually enough root to destroy it.

"But now, as regards pulling docks when the flower has advanced, it is but right to caution the farmer against the practice of putting them in a corner of the field, out of the way, for the thick succulent roots will have sufficient vitality, and especially if kept moist by companionship, to grow again."

828. **Remedy for Short Pastures.**—Those who have but a limited range of pasture, and keep stock enough to crop it close, are always at the mercy of the weather. If there chance to be favoring rains, and a good season for the growth of grass and clover, all is well; but if, as frequently occurs, there comes a long period of drouth, the brown fields, already close cropped, fail entirely, having little to protect the roots from the full power of the sun, and the cattle suffer, and milk-pails show serious diminution, the dairy profits shrink, and the effect of the drouth will be felt throughout the season, for much of the pasture being thus summer-killed, the full flow of milk can hardly be regained.

This may be guarded against by putting in a small plot of corn, sorghum, millet, or other suitable crop for cutting and feeding green. An acre of corn sown broadcast will very soon yield sufficient to give great relief to the short pasture. It is not necessary to stable the cows; cut a good supply for them, and feed night and morning before they leave the yard; they will eat it with a relish, and make ample returns in the milk-pan and the churn. Even if the threatened drouth does not come, and abundance of grass should grow, the soiling crop need not be lost. Cut at the proper season, and properly cured, it will not come amiss next winter.

829. **Mixing Stock in Pasture.**—In Nos. 24 and 110 we have treated upon overstocking the farm, and how many cows an acre of good pasture should support, but no one will get the full value of his pasture if he has but one kind of stock. There is just as much economy in grazing bullocks and sheep upon the same farm, as there is in having hogs follow the herd while feeding corn. Every feeder knows that hogs will fatten well upon the droppings, and every grazier who ever tried it, knows that sheep will fatten upon herbage rejected by the bullocks, and the pasture for both classes of animals will be improved, and if not overstocked, both will do better than one sort alone.

830. **Improving a Wild Pasture by Sheep.**—Mr. Fay, of Lynn, Mass., states "that on a tract which was overrun with woodbine, briers, and other shrubs, he turned 150 sheep. At that time a cow could not have lived on the whole tract. The sheep were kept there several years, and so killed out the wild growth that the tract now affords good pasture for 15 cows." We suppose the sheep were fed elsewhere, and were occasionally turned on this waste land merely to enrich it by their droppings, and kill out the useless herbage and shrubs.

We have known a great deal of this work of killing out bushes and briers done by the aid of salt—fine salt thrown upon the leaves while wet, to induce the sheep to browse them off. In this way a thick plat of bushes may be so killed out in a single year, that the land will take grass seed.

831. **Cattle Forage—How to Produce and how to Use it.**—This is one of the most important questions for the stock farmer, both summer and winter. Manuring pastures is not as unprofitable as some persons suppose. A dressing of either lime, ashes, plaster, superphosphate, guano, bone-dust, niter, potash, salt, upon pasture, will almost always increase the feed to a value much above the cost of the application. If pastures fail in drouths, cattle must be fed. The question is, upon what? We answer, any green food that can be grown in season. At one time, rye—another, oats—then, corn, buckwheat, turnips, etc. Grinding grain increases its value.

One writer suggests grinding the entire straw and grain together. Will that pay? We doubt it. Much has been said and done about grinding cobs to increase the forage. We would give just as much for basswood rails as for corn cobs, to grind for any kind of stock. For hogs, we believe cobs are absolutely worthless. For horses, neat cattle, or sheep, clean cut straw is better than ground cobs. As to grinding corn fine or coarse, it does not make so much difference, if fed immediately to the hogs. For any other purpose on earth, coarse meal is better than fine; and for human food, fine meal that has been ground a month is absolutely deleterious—it is not fit to eat.

One farmer says: "I found that cob meal lessened the richness of the milk, though one animal fed with corn and cob meal did thrive better than upon corn alone.

"Corn cobs weigh seven pounds to the bushel, and some of my neighbors say it will not pay the extra cost of grinding the cobs, as it costs a quart more corn to grind a bushel of the cobs and corn together, than it does to grind the corn alone, so that in fact we give a quart of corn for seven pounds of cob meal. I have ground a good many cobs, and have now thrown away my cob-mill, and would not give it house-room. I can not afford to grind cobs, nor to feed any grain unground; and I can not afford to feed hogs with uncooked meal. I cook meal six or seven hours, and I practice feeding it to hogs hot. The corn cob has some value, but not enough to pay for grinding. We can not grind cobs fine without great expense."

832. **Amount of Fodder Necessary.**—"The Springfield (Mass.) *Republican* states that William Birney has wintered forty-two cattle, three horses, and four sheep on the produce of sixty acres of land, which, supposing the whole stock to equal forty cows, gives an acre and a half of land for the annual sustenance of each animal. Wheat bran and oil-meal are purchased and used for the stock, which is balanced by the disposal of corn and hay of equal value. The amount of fodder consumed daily by Mr. B.'s stock is stated as follows:

378 lbs. of chaffed corn fodder and straw	$1 89	20 bushels roots	$2 00
77 lbs. long hay	70	Fuel for steaming the above	40
120 lbs. wheat bran	1 20		
10 lbs. oil-meal	17	Total	$6 48
10 lbs. cob-meal	12		

"This makes a cost of about seventeen cents a day for each animal. It is stated that the stock is in fine condition, and that the quantity of milk diminishes when steamed food is withheld. Mr. B. generally cooks twenty bushels of roots per day for his stock, and on feeding, by way of experiment, the same quantity raw for three weeks, there was a diminution equal to a quart of milk a day to each cow."

Estimating the roots at fifty pounds per bushel, and adding that to the other articles, will make 1,595 pounds of food daily; divided between forty cows, is within a fraction of forty pounds of food to each, which is 14,600 pounds for the year. This is seven tuns three cwt. per annum for each cow, which looks like pretty strong feeding; but we have just read a statement of a writer who declares that it will require from five to six tuns of the best timothy hay, or its equivalent, to support an animal twelve months; and as no land in this country has produced this quantity, he argues that no man can sustain a cow per acre. With him, two horses and sixteen cows, mostly dry, consumed a tun of hay per week, besides brewers' grain and turnips in abundance.

SECTION XLVII.—HAYING AND HAYING MACHINES.

IN the single, comprehensive word haying, we have the most important matter connected with American agriculture. The hay crop is of more value than the cotton, the corn, or the wheat crop, or any other single article of farm produce, and upon many farms of more value than all others combined. Of what immense importance, then, is haying. Of what vast consequence to individuals, and to the whole country, that the best of all appliances that modern ingenuity has provided should be brought into use to save the hay crop—the crop upon which the lives of three fourths of all the horses, cattle, and sheep in the United States depend from November to April. One half of the year, in the States that produce the working animals, as well as beef, butter, cheese, hides, mutton, and wool—these animals so necessary to our existence as a civilized people, must be mainly supported upon hay. We could find a substitute for every other crop grown. For hay there is none.

Farmer! have you thought how much depends upon the four weeks of haying time? Are you provided with the tools necessary to secure this immensely important crop in the short season that nature gives you? For you must "make hay while the sun shines;" and that never again will shine enough during the haying season, in this country, to enable you to make it with poor old hand-scythes, fastened to crooked sticks cut in the woods, and forked sticks for pitchforks, with rakes to match—such as were in almost universal use in New England fifty years ago.

You can not secure your crop with such tools. Fortunately, you have no need to use such. None but a sloven will. None but a bad manager will use hand tools, excellent as they now are, except to a very limited extent, because Yankee ingenuity has been at work, and machines have been invented, tried, improved, tried again, and now are extensively manufactured in an almost perfect state, by which horse-power is substituted for man-power to mow the grass, to spread it, to rake it in windrows, and, in some cases, to pull it together in cocks, or to the stack; to lift it from the ground to the stack, or upon the hay-cart, and then to lift it again from the cart to the mow—all by horse-power. Have you got these machines, or any one of them?

833. **Mowing Machines.**—As most important of all farming tools, have you got a mowing machine? Of these, the family is numerous—all children of the original American reaping or mowing machine, invented and put into successful operation by Obed Hussey, of Baltimore, within the last twenty years, and all, with slight variations, working upon the same principle.

Upon Hussey, McCormick improved, and carried off the palm of success, until "McCormick's Reaper" has become of world-wide renown.

Though both of these original machines would cut grass, they were not successful enough as mowers to come into general use. The honor of a successful mowing machine was reserved for Ketchum, of Buffalo. His first machines gave great satisfaction though requiring a strong team, and were too heavy and costly for small farmers. "Wood's Improvement" of the Ketchum machine has been generally considered an important one.

Of mowers, up to the haying season of 1858, the great want was a one-horse machine that would do the work as perfectly as the best two-horse machines, with speed proportioned to the power. In short, a machine for small farmers, such as compose nearly nine tenths of the population of all the Northeastern States.

Since that date, such machines have been extensively manufactured. One made by Joel Nourse, of Boston, we have seen in successful operation. It is a machine that no man who has five acres of grass to cut can afford to be without.

It is constructed entirely of iron, with a movable cutter bar, adapted to uneven surfaces, or it can be raised from the ground and held stationary while driving from field to field; it certainly looks as though it had all the elements of strength and durability, and yet it is not heavy. One of the advantages of such a machine we will state: A gentleman bought a small place, which was mostly in what the owner called grass; it was, however, more than half weeds, upon a rough surface, and the first year afforded a meager crop of poor hay, cut at one mowing with a scythe. In the spring, he procured one of these little machines, and as soon as the weeds were large enough, he harnessed his carriage horse to it, and mounted the seat and shaved the lot. During the summer he repeated the operation, again and again feeding the crop to the horse and cow. The consequence is, that the weeds are killed, and the grass much improved.

The swath cut by one of these machines is about four and a half feet wide, and the work done is at the rate of six or eight acres a day of heavy grass; and it will stop and start anywhere without clogging.

It has another advantage: it costs something like fifty dollars less than a two-horse machine.

It works so easily that we have seen one man pull it through grass stout enough to make a fair swath; and one horse can work it without fatigue, and in very small inclosures—in almost any situation where mowing can be done with the hand scythe.

The advantage of such a machine in a hilly region is very apparent. No farmer can afford to do without one mowing machine, and some can afford to have two. Every one who has one of heavy draft, or with any serious imperfection, can afford to buy a new one. The great hay crop hereafter *must* be cut by horse-power.

There is another great advantage besides substituting brute for man power. With the scythe, the man must cut the grass while the dew is on, and that requires extra labor to cure it and extra labor in saving it. With the machine, the grass is more easily cut dry, and time is afforded to do it; and the man, while riding and guiding his mower, has no fear of the burning sun. It is the horse that sweats, not the man. He rides at nearly as much ease as he would in his wagon on the road to mill.

834. **Horse Rakes and other Haying Machines.**—Of horse rakes there are several patterns, all good, and some of them operate with as much ease to the man as the mower; for he sits in a chair, mounted upon a pair of wheels, to which the rake is attached. To rake hay by hand, when it can be so much more speedily done by horse-power, shows a great want of economy and sound judgment.

Unloading hay at the barn by horse-power is such a simple operation, that it seems wonderful how a sensible farmer can continue the excessively hard labor of lifting it, a forkful at a time, in the stifling heat of the barn, of a July afternoon.

To unload by horse-power, a tackle-block is attached to the ridge, the fall being brought down to a snatch-block at the door, to which the horse is hitched, and as he walks off on the ground, up goes the "horse-fork," with almost a fourth of the wagon-load at once; it is pulled to its place by a guy rope, when, by unloosing a catch, it is upset all in a heap.

Stacking is done by the same operation; using a set of shears—three poles in a triangle—set up over the wagon, to sustain the tackle.

We have now indicated some of the most important labor-saving implements of the hay-field, to which should always, on a large farm, be added a tool-wagon, made convenient to carry all the hand-tools, always including a grindstone, and the spare clothing of the men, and a large refrigerator of ice water as a substitute for that accursed old black jug that has been the ruin of so many men in haying.

With this we close our homily upon haying, and repeat the question to every farmer, Are you ready? Have you got any, or all of these appliances? If not, there is no time to lose; the haying season comes round with the revolving seasons, always once a year.

835. **Stacking Hay.**—We ask the reader here to refer to what we have said in 756 upon stacking grain, as it is equally applicable to stacking hay, and in both cases we must advocate stacking in an economical point of view. Stacks of hay or grain, well built, will keep, with an amount of waste absolutely less than the interest of the money that barn shelter would cost. Whatever the size of a stack, a hen's egg should be taken as the model of form, the small end up, which should be made to shed rain as perfectly as the roof of your own house. The most perfect mode of doing this is to take straw, or long, coarse grass, and commence at the lower part of the taper, and thrust a little handful at a time into the stack until you encircle it, leaving the long ends hanging straight downward, and then put in another course a little above, lapping over the first one, and so on, tying the

apex to a little stick thrust into the top, making, with two or three hours' work, a thatch that will preserve the stack for years.

We have seen the thatching of a stack made somewhat as tassel fringe is made, by twisting the long hay into a small hay-rope on the ground, until enough was made to cover the stack-top, the whole being rolled up in bundles as large as a man could carry up a ladder, when it is unwound and pinned to the stack. This is more work, and only better when there is danger of the thatching blowing out when put on in the manner first described; and that difficulty can be obviated by drawing hay-ropes or cords of twine around each course of thatching.

After the stack of hay has settled, if it is found that the stacker did not allow enough for the settling, and the bulge comes down too near the ground, take a hay-knife and cut away enough to give the stack its proper egg-shape. If a mistake has been made in a grain-stack, it can not so well be remedied. Always remember that a well-formed stack will be, after it has settled, smaller at the bottom than it is a few feet above. In a stack of six tuns, there should be room enough for a man to lie down under the bulge and be well sheltered from a shower.

In building ricks, or long stacks, the same rule as to form should govern the builder as in building a round stack, so that looking at the end we should see the same egg-shape; and in building ricks or stacks of sheaves, the secret of success is keeping the middle full, so that the butts of all the sheaves are a third lower than the tops. Such a stack will always shed rain.

There is no doubt that hay or grain may be put up in a stack much greener than in a barn, with perfect safety, and if we make a hollow stack, as is sometimes done in England, by setting up four poles, three feet apart at bottom and joined at top, we could stack our hay as soon as it was what we now consider half-cured. This country, as a general thing, has a good deal yet to learn of the art and economic value of stacking hay and grain.

836. **A Machine to Stack Hay** is in use in some places in Ohio, but very little known in others. A mast is framed with braces into a foundation that moves like a sled, and can be drawn about from place to place in the field, or carried on wheels to distant fields. At the top of the mast is a yard, braced by a rope at one end, with a tackle-block at the other, from which a fork is suspended, upon which as much hay can be hoisted at once by a horse as a man could fork up at a dozen times. Sometimes the stack is so situated in relation to the cocks, that they are brought up to the frame by a drag-rope, and hoisted bodily to the top of the stack.

A very convenient implement for moving cocks up to a stack may be cheaply made as follows: Two white oak or ash poles, about twenty feet long, framed together in the middle by three cross-pieces, three feet long, are formed like shafts of a wagon at one end, sharpened at the other and smooth, to run under a cock of hay. The shafts should be cut and framed while green, and then bent and seasoned in the proper shape, so that when attached to the horse the rear part will rest flat upon the ground. A boy can operate it as well as a man. He trots rapidly between the stack and cocks, leading short distances or riding long ones. He backs up to a cock, running the poles under it, and then throws a rope around, which is attached by one end to the off-shaft, and draws it tight and hitches the other end by a loop to a hook on the other shaft, and then trots back to the stack, casts his rope loose without stopping, and hurries back for another load. It is a very rapid, easy way of stacking hay—a man and boy and two horses will haul and send up the hay as fast as the best stacker can place it.

837. **Storing Hay—Ventilation.**—Many farmers, those of New England in particular, have a custom of storing hay in large masses in the barn, in a place called "the bay," without a sign of any ventilation under the bulk, which usually rests upon a few loose poles or boards on the damp ground. A "bay" should have ventilation, not only under it, but up through it, by means of a chimney made of four poles fastened together by rounds like a ladder. A loose stone foundation could be laid for the hay bottom, with an air-chamber from the outside leading to the chimney, directly over which there should be a ventilator in the roof. This simple contrivance would not only save many a tun of hay from mustiness, but it would enable the owner to put in his hay in a much greener state. That next the chimney would always come out very sweet.

It is also an excellent plan to ventilate stacks. It can be done by setting up four rails, two feet apart at the bottom, fastened close together at the top with a rope, strip of bark, or a withe. We once put up a very large rick of wheat, that is, a long stack, which was thought too green to keep well, but it did, for we took a convenient rail fence and built a flue sixty feet long, big enough for a man to crawl through, in the center of the foundation, so that a current of air passed up all through the wheat. At another time, in building an immense rick of prairie hay, we made an air-tube of brush, which greatly aided in the preservation of the hay. A good timber bottom, elevating the whole stack so that air would circulate under it, would be still better.

838. **Hay Caps, their Value—How Made.**—We look upon hay caps as we do any other labor-saving implement in hay-making, and they are of such great advantage that we never heard of any one who had once learned their value, who was willing to forego their use. They are the means of saving thousands of tuns of hay after it is well cured, every year, in Massachusetts, where they appear to be best known and most used. Simply cotton cloth caps, pinned with little sticks over the haycocks that are in danger from an approaching storm, are the kind most in use there. Grass may be cocked as soon as wilted, and hay improved, if you are provided with hay caps. One of four feet or four and a half square is considered ample size; and of compactly woven, good, though light sheeting, much better than heavy, and a simple ring-loop of cord sewed in at each corner, but left so as to slip, finishes the cap ready for use. It is fastened at the loops by pins fourteen to sixteen inches long. Take care not to pack them or let them

lie in a heap when wet or damp. A season may pass, and they will be of no use; but another time they may pay the whole expense in protecting the hay through a single storm. A sheet twelve or fifteen feet square should always be kept on hand to cover a half-finished stack or load of hay caught by a sudden shower.

839. **The Best Time to Cut Grass** should be authoritatively settled, and not left to mere assertion; one farmer contending that it is best to cut it in the blossom, and another not until the seed is partially ripe.

Levi Bartlett, who is good authority, says: "As far as practicable, we cut our herds-grass when the seed is in the dough state, and before the bloom is much shed. It is said by those who have carefully investigated the matter, that too early mowing of herds-grass results in great injury to the next year's crop, much more so than to that of other grasses. It being a bulbous-rooted plant, if cut too soon, the bulb has not stored up the necessary nutriment in it to secure a vigorous after-growth. Clover should be cut when about half the blossoms have turned brown, and cured mostly in the cock."

When should grass be cut? Our answer to the question is this: While it is grass, and not after it has become hay. To make good food for cattle, the grass must be cut and cured, not cured and cut. A new and rather thinly-seeded piece of timothy will grow coarse stalks, which must be cut while younger than the crop of an old field which was thickly seeded, and has grown thick and fine. The field where the growth is thin we would cut as soon as it blossomed. The field where the stalks grow thick and fine we would allow to stand still until the seeds in the but-end of the heads were in the milk, and after the grass was cut, a portion of them would mature so as to grow. Other grasses and clover we would cut in full blossom, taking care not to dry them to death in curing. We would never mow while the grass was wet with dew or rain; and if cut with a machine, we would not care how soon after it was cut it was raked into windrows with the horse-rake. If cut with a scythe, turn the swaths over as soon as the top is well wilted, and, after an hour or two of hot sun on the other side, let a man with a three-pronged fork begin to pitch the swaths together into windrows. If not previously bleached, grass will stand a hard rain in swath or windrow without serious injury. It should always be put in good-sized, well-made cocks before it is dry, and then let it sweat. It may even turn black without injury, but it is preferable not to allow it to reach that stage, for fear acetous fermentation should take place. No matter how green the grass or hay of the cock looks, or how much it smokes from the sweating process when you pitch it on the wagon, if the air is hot and windy, it will dry out so as to keep perfectly in the mow or stack by the time you have pitched and carted and pitched again, and then again in mowing it away. Grass cut at noon may be cocked at four o'clock and hauled the next morning and make better hay than it would if cut in the morning and afterward spread, and stirred, and raked, and pitched about, and finally cocked in the afternoon, and the cocks opened and shaken up again the next afternoon, because they felt a little warm inside, and finally, after getting as dry as tinder and puffy as feathers, hauled away to the barn. In our opinion, there is a foolish fashion of cutting grass with the dew on, and an unnecessary labor in curing it, and an altogether causeless fear of putting hay in the barn too green. It should be put away in such a condition that it will be green in color when fed out in winter. We can hardly set too high a value on flavor in hay. The relish with which food is eaten makes part of its value; and it goes further with man or beast than that which does not relish.

840. **When to Cut Timothy for Seed.**—When the heads have simply turned brown, the seed is fully matured; and if it is cut then, but little of it will be lost by shelling, and the stalks and leaves will make, sometimes, tolerably good fodder, especially if it is run through a straw-cutter.

The spot for seed should be selected early in June, or July, where the timothy is the best and tallest, and where the heads are longest, and if there are any noxious weeds, improve some leisure hours in pulling or cutting them all out. When we come to cut it, if a single weed has escaped notice, let it be taken out at that time. We have known several prairie farms stocked with weeds, where none grew before, from sowing what was bought for pure grass seed.

841. **How much Grass can Land Produce?**—It has been published that, upon the Earl of Derby's land, a field of one hundred acres was dressed with liquid manure, by a steam-engine and pipes, and a hydrant and hose to each ten acres, and this land was mowed seven times, and gave upon one acre one hundred tuns' weight of grass, and estimated an average of seventy-five tuns upon each acre. The meadows near Edinburgh, watered with sewerage water, grew fourteen feet of grass a year, which, cut at several times, weighed some eighty tuns. In Ayrshire, similar treatment of forty acres of land has enabled its owner to feed one hundred cows. If the grass upon one acre should weigh one hundred tuns, perhaps it would not make over twelve tuns of dry hay. Mr. Lincoln, of Worcester, Mass., has done something like this.

842. **How much Hay must we Provide?**—How much hay to provide, or how much to feed to each animal, is a matter not sufficiently understood. The following is the English rule, said to be made from careful experiment with good sound English hay. An ox requires two per cent. of his own weight in hay per day if he does not work, and two and a half per cent. if he works. If you have an ox that weighs 1,500 lbs., he will require 30 lbs. of hay per day if he does not work. Apply this rule to all neat stock, and give to each animal twice as many pounds as it weighs hundreds. In this latitude, the period of winter feeding is never less than one hundred and fifty days, and oftener one hundred and eighty, and it is not safe to calculate upon less than two tuns a head of sound hay, or its equivalent, for a stock of oxen, cows, heifers, and steers. The equivalent in turnips is 5 lbs. to one of hay. So if an animal requires 20 lbs. of hay, and it is thought best to give only half that quantity, and make up the required quantity in

turnips, 50 lbs. must be given. The equivalent of corn meal is estimated at about $8\frac{1}{2}$ lbs. of meal to 15 lbs. of hay; but we have no doubt that a milch cow or a working ox would do better upon 10 lbs. of hay and 5 lbs. of meal than upon 20 lbs. of hay. Of milch cows, however, it should be remarked that they must have more than two per cent. of hay, or its equivalent, to give a profitable yield of milk. Carrots, beets, turnips, ruta bagas, may be calculated at nearly double the value of white turnips. In England, mangel-wurzel is preferred to all other roots for feeding milch cows.

843. **Pea Vine Hay.**—In the Southern States, the vines of the "cow pea" (*phaseolus*), are sometimes used for hay. The peas are usually planted among corn after the last working, in hills four feet apart, midway between the rows. For hay, the vines should be gathered while the pods are green, and well cured under shelter before stormy weather, or the leaves will mold. A planter in Mississippi says: "I gather my pea vines about October 1st, and cure them in windrows by turning several times daily.

We know of no reason why this kind of pea could not be grown for hay in most of the Northern States. There is a sort called the Oregon pea, that originated in the State which gives it the name, which could be grown on this side of the continent, as far north as it grows at the "Far West."

844. **Hay Rigging of Carts and Wagons.**—A properly constructed hay wagon is one of the important haying implements that should not be, as it too often is, neglected till the last moment, when a rack is patched up "so it will do for now," and like nearly all patched-up tools it does very poorly. Every farmer should have a well-constructed hay-rack, made to fit the wagon or cart, of light, strong materials, put together with screw-bolts, so it could be readily taken apart for storing away when not in use. With the hay-rack there should be a light, strong, folding ladder, attached so that it could always go with the wagon, without occupying any more room than a round pole three inches diameter and of only a few pounds' weight, easily drawn out from the load, and in one minute you open out a ladder twelve or fifteen feet long, being not only convenient, but a real labor-saving implement—saving time, strength, and danger, in climbing on or off a load of hay or stack.

As it would be a great annoyance to have a wagon-tire come off while hurrying home a load of hay to avoid a shower, you must guard against such a misfortune by having the wheels manufactured in such a way that tires will never get loose. See that they are made of thoroughly seasoned wood, and then, before putting on the tire, saturate the felloes with linseed oil. To do this in the best manner, a cast-iron trough will be required in which to heat the oil and keep it boiling—not burning hot. Hang the wheel on a stick through the hub, so as to turn freely, and suspend a portion of the rim in the oil, where it must remain one hour or more for each portion. Then set the tire, and it will never run away and leave the wheel, since no change of the hygrometrical condition of the atmosphere will affect wood perfectly saturated with boiling oil, and, besides that, it will be much more durable. An ordinary painting of felloes is of no more value than a coat of boot-blacking would be. It is washed and worn off in the first mud puddle.

845. **Carting Hay to Market.**—The following is the statement of work done by one Long Island farmer, in carting hay to the New York market.

Ten years—70 loads each, carried 24 miles, and the return journey added, gives 48 miles per load of travel—equal to, say .... 33,600 miles.

Then by simply straightening the road, which should have been done at first, the distance was lessened six miles:

Ten years—70 loads each, 18 miles, and the return, making 36 miles per load of travel, equal to	25,200 miles
Eleven years—60 loads each, same distance	23,760 miles
Making	82,560 miles

that this farmer has traveled on his hay wagon. His loads have averaged about a tun and a quarter in weight, so that in his 2,060 journeys, he had carried 2,575 tuns of hay, which sold for over $40,000. In that thirty-one years, and for that amount of work, he used but four teams, and at sixty-five years old he was still in hale health, as we should suppose a man would be who was so much exposed to pure air and engaged in moderate, healthful employment. Although this man may have done well, it is a matter worthy of consideration whether he could not have done better if he had fed all this hay upon his farm and sold the animal products, for then every tun would have reproduced itself from the manure, if well saved and increased by use of muck, and carefully applied to the land.

846. **Number of Cubic Feet in a Tun of Hay.**—It is important for every farmer to know how many tuns he has stored, because the number of cattle he may winter is always based upon the number of pounds of hay he can feed them. It is also important in case of buying or selling hay, because if the quantity in a mow can be approximated by measurement, it will save the labor of weighing and something in the value of hay, which will be deteriorated by the handling necessary to weigh it with the appliances ordinarily at hand in the country.

In estimating for our own use, we would always count gross tuns. In buying or selling, it should be as we could agree; the custom of the locality would govern the calculation.

An old farmer thinks that to those living at a distance from hay-scales, the following plan will be desirable. It is this:

"Multiply the length, breadth, and hight into each other, and if the hay is somewhat settled, ten solid yards make a tun. Clover will take from ten to twelve solid yards per tun."

This statement has been extensively circulated, and we print it here to prove that it is erroneous, which we do by the following testimony. We hope all who have circulated this error will inform their readers that, in a well-settled mow of good hay, where ten to twenty tuns are stored together, they may ascertain the number of tuns approximately, by careful measurement and calculation of one tun to from four hundred to seven hundred cubic feet, according to quality and the degree of pressure. Nowhere but in the bottom of a large mow of timothy hay will four hundred feet make a tun. But to the testimony. One writer says:

"At or near the bottom of a large mow where twenty tuns are stored, four hundred and fifty feet will make a tun; while near the top of the same it would take seven hundred to seven hundred and fifty feet. It rarely takes one thousand feet, where hay has lain together a length of time, unless it be coarse and near the top, when it may sometimes require even that number of feet."

E. Pratt, Jr., of Freeport, Me., says:

"In a mow forty feet long, sixteen feet wide, and fourteen feet deep, well settled, the common estimate is from four hundred and twenty-five to five hundred cubic feet for a tun. For some fifteen successive years I have pressed hay in my own barn from a mow less than the above, and the average number of cubic feet required—including tare, which is about five per cent.—has been about four hundred and twenty-five feet per tun."

C. W. Fairbrothers, of Saxton's River, Vt., says:

"I have had some experience in measuring and weighing hay, and find that of what we call scaffold hay, not pressed, of a coarse quality, it takes some seven hundred feet to the tun. But of scaffold hay pressed by grain being put on the top of timothy and red-top, free from clover, we have a rule to allow eight feet cube, or five hundred and twelve cubic feet to a tun, and the same rule will apply to a mow of considerable size and same quality. It takes somewhat more clover to make a tun."

A farmer of West Enosburg, Vt., says:

"When there is a large quantity together, four hundred cubic feet will make a tun; but where only a small quantity like a scaffold is stored, it will take for a tun not far from five hundred cubic feet. It depends something on the quality, but I am speaking of good herds-grass hay. I saw a scaffold measured and weighed a few days ago; it was twenty-six feet long, eleven feet wide, and nearly five feet high, making one thousand four hundred and thirty cubic feet; it weighed five thousand eight hundred pounds—so you must see that it varies but a fraction from five hundred feet to the tun."

A Jefferson County (N. Y.) farmer gives a cube of seven feet of good hay as a tun, by actual measurement and weight, in a large mow. Scaffold hay, he says, "I buy or sell at five hundred and twelve feet, or eight feet cube for a tun."

William Pease, Oswego, says, March 16th: "I have just measured and weighed a mow of hay, two thirds clover and one third timothy, cut wet and dried, and pitched with a horse-fork, and stored six months in a mow twelve by twenty-six feet, ten feet deep, which took five hundred and forty-nine cubic feet for a tun."

H. Robie, Georgetown, N. Y., estimates five hundred feet as the fair average for a tun of hay in well-settled mows, and seven hundred feet on scaffolds.

C. W. Ingerson, New Bremen, Lewis County, N. Y., says:

"I have carefully measured and weighed several mows of hay; in all cases it was weighed in the barn, and varied but little from four hundred cubic feet for a tun. A piece cut from the middle of a good-sized mow, seven feet square by eight feet deep, or three hundred and ninety-two feet, will weigh a tun. And there is not the difference generally supposed in the top and bottom of a hay-mow which has lain from harvest until winter. I speak of timothy or herds-grass, cut when the seed had nearly matured, mowed in the forenoon, and secured in the afternoon of the same day."

J. W. E., West Almond, Alleghany County, N. Y., says:

"I filled a mow that is fifteen by thirty feet with common timothy hay, so that it settled to twelve feet high. I weighed out twelve tuns, which is four hundred and fifty feet to the tun."

J. T. Keeley gives the following weight and measure of his mows:

"Mow No. 1, twenty-one by twenty-one feet square, thirteen feet in depth, required four hundred and sixty solid feet to weigh two thousand pounds. This hay was timothy, not very coarse; cut while in blossom, and well mowed away by two men.

"Mow No. 2, ten by twenty feet square, five and a half feet in depth, the hay the same quality as No. 1, required six hundred and fifty solid feet to weigh two thousand pounds.

"Mow No. 3, eleven by twenty-four feet square, fourteen feet in depth, timothy hay, part of it rather too ripe when cut; required five hundred solid feet to weigh two thousand pounds.

"My experience is, it will require five hundred solid feet of timothy hay, cut in season and mowed away as it should be, to weigh a tun taken from the center of a mow twelve by twenty-four feet square and ten feet in depth."

J. W. Cressinger, of Sullivan, Ashland County, Ohio, writes, March 20th:

"That the result of weighing that day was one hundred and forty pounds to a cubic yard from a mow fourteen by sixteen feet, the hay lying about twelve feet deep, and that taken out to-day was half way down. This was timothy, with a trifle of white clover, cut the second week of June, when the first blow was off. Previous weighing has clearly proved to me that timothy hay, cut when the blow is off, and before it is ripe and properly cured, will weigh from one hundred and thirty to one hundred and forty-six pounds to the cubic yard, and clover from one hundred and twenty to one hundred and forty pounds to the same. I find that fourteen and a half cubic yards of mow or stack hay well packed, if taken below half way down, will make one tun where there are more than four tuns put up together; fifteen cubic yards, taking the whole together, will make one tun where there is not too much clover among it; and clover will take of an average sixteen cubic yards."

A farmer of Cass County, Mich., says, March 4th:

"I have just measured ten feet square, thirty inches deep, of a well-settled mow, which weighed one thousand pounds."

G. G. Snelling, of South Thomaston, Me., says:

"I have sold hay from the bay or ground mow, four hundred cubic feet to the tun; but in doing so, have discovered that I generally suffered loss. Hay on scaffolds requires more cubic feet to the tun than hay in bays. Since reading your article, I sold from the bottom of a hay-mow, thirty feet long, ten feet wide, and originally fourteen feet high, two tuns and three quarters of very fine hay, and found on accurate measurement that it occupied eight hundred and thirty-one cubic feet, or a fraction over three hundred and two cubic feet to the tun. From the top of another mow, the hay a little coarser, I cut a square, eight by ten feet, and took off the hay to the depth of three feet, and found it weighed one thousand one hundred and seventy pounds, which is about four hundred and ten cubic feet to the tun. Hay, according to bulk, weighs more some years than others. Last hay season I discovered, on examination, that the stalk where it was cut by the scythe was entirely filled—a circumstance which rarely occurs."

J. Farnum, of Uxbridge, Mass., gives four hundred feet for a tun in a mow twenty feet high, twenty feet long, and twenty feet wide, as the lowest number of feet he ever heard estimated.

"In a scaffold of hay eleven and a half feet by eleven and a half feet square and nine feet high, making one thousand one hundred and ninety and one quarter solid feet, there was by actual weight five thousand and seventy-six pounds of hay, or a little over two tuns and a half of hay. The hay was what is here called intervale upland, a kind resembling the English red-top, though not so valuable. This estimate gives a fraction less than four hundred and sixty-nine cubic feet to the tun. Under ordinary circumstances, five hundred solid feet of well-packed, not very coarse hay is considered with us to be a fair estimate for a tun."

Harvey Head, of Paris Hill, N. Y., says: "I have two barns thirty by forty feet, each of which has a bay across one end sixteen by thirty feet, which at fourteen feet high to the plates gives six thousand seven hundred and twenty feet as the contents when filled. For the last fifteen years I have usually sold one of these mows, generally by weight. I find by looking over the account that nine tuns and eight hundred is the least I ever weighed from one of them, and that fourteen tuns and seven hundred is the largest amount weighed from the same hay. In the case above, the mows were filled above the plate with oats in the bundle. You will see by the wide difference above, that I have long understood that without a good sound discretion to back it, there was no safety in buying or selling hay by measure. For while it will be difficult to get a tun of coarse clover and timothy hay into seven hundred feet, it will require no very sharp practice to get a tun of pure timothy that will make about twenty to thirty hundred to the acre into four hundred feet. The heaviest hay we make here is timothy. Take a field of it not so thick but the sun shines quite to the ground among it, cut when a little past full in blossom; if good weather, get in the same day; the mow will steam just enough to pack solid, and four hundred feet make a tun. Dry the same hay crisp, so that the mow never warms, and it will take four hundred and fifty feet or over for a tun. On the other extreme, take a field of coarse-lodged clover sparsely sprinkled with coarse timothy all out of blossom, and it requires seven to eight hundred feet in large mows to make a tun."

Asahel Burnham, Jr., of Arkwright, Cattaraugus County, N. Y., gives four hundred feet as the rule for a tun.

B. P. H., of Onondaga, says: "The hay that grows on old, worn-out meadows is much heavier, according to bulk, and far more nutritious than that on meadows recently stocked down; besides, the quality and weight of hay on the same meadow varies from year to year; in a very wet season you get a greater bulk; in a dry season greater weight; and clover hay occupies a quarter more space than timothy, so all rules are uncertain."

C. H. Harroun, of Patterson's Mills, Iowa County, Mich., says his experience in selling hay is, that timothy mixed with one fourth clover, cut when timothy begins to ripen, and cured in cocks, and packed in a mow eighteen by thirty feet, and kept over summer, weighed a tun to four hundred cubic feet. Clover took five hundred and twelve feet to a tun.

A. S. Myrick, of Jefferson Valley, N. Y., says: "Dederick's presses make a bale of three hundred and seventy-five to four hundred and twenty-five pounds in twenty cubic feet (four feet by twenty-four inches by thirty inches)."

The weight of the testimony is that four hundred cubic feet of the bottom of a large mow are required on the average for a tun; five hundred feet in the middle, or as the average of a mow; and seven hundred feet for a scaffold of a few tuns of what is often called English hay, and about a quarter more for clover, The calculation of ten yards is a blunder. If you doubt it, try it. Measure across a mow fifteen feet wide a strip of six feet, and take off the hay three feet deep and weigh it, and see if it makes a tun. The statement, just as soon as you begin to analyze it, will appear ridiculous. The smallest quantity given for a tun is a cube of seven feet—three hundred and forty-three feet. As a general rule, it will do to calculate every cube of eight feet in a large mow as a tun, and unless the hay is packed solid, it will take more rather than less than such a cube to make a tun, particularly if the tuns are estimated at gross weight, which we think is the general custom.

With the above estimates, based in most cases upon actual weight and measurement, the farmer will have but little difficulty in determining how much hay he has stored in any particular place.

CHAPTER X.

ROOT CROPS AND SUGAR CROPS.

SECTION XLVIII.—POTATOES, TURNIPS, BEETS, CARROTS, PARSNEPS, ONIONS

THE value of root crops other than potatoes has never been appreciated in this country as much as in Europe; for instance, turnips in England and beets in France. The potato, *Solanum tuberosum*, is considered indispensable in Middle and Northern States; and the sweet potato, *Convolvulus batatas*, in Southern States. Within a very recent period, American farmers have begun to regard carrots and ruta bagas among the important farm crops. The common white turnip has long been grown by most Northern farmers in a small way, but not as a great field crop, as it is in England. Many farmers, who know very well how easily turnips are grown, have no faith in their value as feed for stock. They have faith in potatoes, and as they are considered the most valuable of all root crops in America, we will open this chapter with their history, and give opinions of practical men as to the value of various kinds and modes of culture.

847. **History of the Potato.**—Historically, we are told that it originated in South America, probably within the torrid zone.

It was introduced into Europe by Sir Walter Raleigh about the year 1586, and into Ireland in 1610, and as a field crop in Scotland in 1728.

At first its culture was confined to the gardens of the nobility of England. In 1613, the price of potatoes is stated, in the household expenses of Queen Anne, at 1s. per lb.

English writers estimate that twice as much food is produced from an acre of potatoes as from an acre of wheat.

No theory of climate, soil, or culture can as yet explain the phenomena of its growth, or the nature and cause of the disease which of late years has reduced it from the most certain to the most uncertain of crops.

Though a native of the torrid zone, it grows most luxuriantly in the Northern States and British provinces of this continent, while in Ireland its culture attains the highest relative importance. In Sweden it is cultivated as far north as the sixty-fourth degree. The origin of the various sorts now in use is from planting the seed of the balls, or where the seed has accidentally sprung up and produced tubers.

The potato known as the Mercer, or Nishenock, was first grown about forty-seven years ago, in Mercer County, Penn., on Big Nishenock Creek, by John Gilkey, who called it the Nishenock Royal potato, and it got the name of Mercer from Mr. Bevan Pearson, who carried a few in his saddle-bags to Darby, below Philadelphia, from which point they have spread over the United States under the name of Mercers, while from the original point they have spread under the other name, which has been corrupted into Neshanocks, Meshanocks, Chenango, Bone's potato, and several other misnomers.

Rev. Chauncey E Goodrich, of Utica, N. Y., has originated more new potatoes than any other man in this country, and some of remarkably good quality. He says of the origin of the potato: "In a state of nature, it is found on the sides of the Andes, and in the adjacent valleys. At the base of the mountains, the tamarind, yam, and banana; the melon, corn, tomato, and pepper come higher up; and above these is the belt where the potato thrives most vigorously, the climate being equable, and the root not exposed to the frosts."

848. **The Character of Several Prominent Sorts of Potatoes.**—The character as well as origin of several sorts of potatoes in general use is given in the following notes, by Nathan R. French, of New York, who has paid great attention to the cultivation, salableness, and value of potatoes as a farm crop. He says: "As a general rule, yellow potatoes are rank and strong—white ones, good flavored.

"The Mercer has been for many years the standard variety. When first introduced, it was objected to on account of the blue streaks pervading the otherwise white meat, but the excellent quality and reliable yield has kept the Mercers in general use. This and other parti-colored varieties are very much whiter when raised in this latitude than at the North, and if Northern seed of these sorts be carried South, the product will be much whiter and handsomer than the original seed, taking precedence in market over the same varieties of Northern growth. The Mercer seems to be now on the decline in many sections, and likely to be succeeded by new varieties of Northern growth.

"The Carter is one of the finest table potatoes ever grown. It is white throughout, slightly oblong, with deep under-set eyes, and when boiled has a dry, light, flour-like appearance, with great delicacy of flavor. It originated some twenty years ago with a Mr. Carter, near Pittsfield, Mass., and was soon cultivated largely by the Shakers. From them the culture spread northward, and is now mostly confined to Washington County, N. Y.

"The Carter ripens late, and has failed of success in this latitude—is very liable to rot, and is now running out where it has succeeded best.

"The White Pinkeyes, or Pink-eye Kidneys, are an old variety of excellent quality, rambling growers, generally yielding fairly upon rich and well-adapted ground.

"Junes, Yellow Pinkeyes, Northern Whites, and Rock Whites are all of the same family, or nearly related. They are yellow-meated, watery, and sometimes rank flavored. They mature early, particularly the Junes, on which account they are a good deal cultivated, and generally escape the rot, and yield fairly.

"California potatoes are oblong-shaped, yellow-meated, parti-colored skin, great size, immense yielders, strong, watery, unfit for the table (of Christians), but are fit successors to the old and discarded Merino potatoes, once so popular throughout New England, and still cultivated in some places for stock.

"The Dikeman is a native of Oneida County, N. Y., where it was started from the seed by a farmer whose name it bears. The tubers are round, white, with pink eyes; it ripens earlier than the Mercer, and generally escapes the rot; is a good yielder, and is extensively cultivated as an early potato for this market. It degenerates rapidly, however, in this vicinity, so that a yearly renewal of seed from its native locality is necessary.

"Western Reds are one of the best of the yellow-meated varieties, and when raised on Long Island or in New Jersey, are very fair table potatoes. They are in large demand for shipping, and are exported to Bermuda for seed, their product—the highly prized Bermuda potato—being returned to us in the spring. It is remarkable that all other varieties tried in the Bermudas have failed.

"The Black Mercer was introduced into New Jersey some years ago from Western New York. It is shaped much like the Mercer; the flesh is entirely white, the skin very dark and thick. It is very late, requiring the whole season to mature; yields largely, producing twice as much as the Mercers. If peeled before cooking, the quality is good, particularly in the spring, though not so dry and light as the Mercer. The dark skin is prejudicial to the sale, and it has rotted badly some years, so that many are now abandoning its cultivation.

"The Buckeyes have been grown in Monmouth County, N. J., with remarkable success. They are handsome, round potatoes, white throughout, except a little bright pink at the bottom of the eye; cook dry, mealy, and fine flavored. They were introduced from Ohio to the vicinity of Rochester by D. S. Whitlock, from whom J. S. Whitlock, of Monmouth County, N. J., obtained seed and planted three acres of sward ground, which averaged 250 bushels per acre; on corn stubble he had an average of 165 bushels per acre. His brother, G. S. Whitlock planted three acres corn stubble which averaged 200 bushels per acre—in both instances giving a yield more than double that of Mercers in the same fields. While all other varieties in the same neighborhood rotted badly, this was sound, and brought the highest price in market.

"The Prince Albert is a seedling imported from England, and introduced into Massachusetts a few years ago; in shape oblong, a little flattened, entirely white, with very few eyes, which lie upon the surface, scarcely indenting the thin, smooth skin, being one of the most beautiful potatoes ever grown, ripening early as the Mercer, of handsome size, sometimes very large, and very productive.

"The Peach Blows and Shepard Reds are seedlings from the Western Reds started by Mr. Shepard, of Saratoga County, N. Y. They are round, with whitish-yellow meat and deep eyes. The former have a parti-colored skin; the latter a rough red skin with pink streaks in the outer portions of the flesh. The Peach Blows are very fine table potatoes, cooking dry and light. They have been grown to some extent in Monmouth County, N. J., with promising success, though they did not attain the size of those raised at the North. The quality, however, was decidedly improved by change of climate and soil, being smoother, whiter, cooking dryer and lighter, and selling fifty cents per barrel higher than those of Northern growth. The Shepard Reds have a less attractive appearance. Both varieties ripen late, and like all late potatoes are more liable to rot than the early sorts.

"Dover potatoes are small, round, red, with deep eyes, white flesh, and from their superior quality sell to a limited extent at good prices. They are not economical for the table, and we presume their yield is light. They grow principally in Rhode Island."

James F. C. Hyde, of Newton Center, Mass., speaks highly of "Davis' Seedling." "This is one of the very best potatoes grown, taking into consideration size, productiveness, and hardiness. I do not mean to say it is of the best quality for eating when compared with the State of Maine or Carter; but I do mean that it is a good eating potato, which, added to all its other good qualities, makes it a very desirable variety. Its color is red outside and white inside, slightly tinged with pink just under the skin; large size, and very free from rot. This variety originated in Sterling, Mass. It is far superior to Peach Blows, Vermont Whites, and Pinkeyes. It yielded better than any other out of the forty kinds I raised last year.

"State of Maine is a fine eating potato, unsurpassed by any in the whole list, not excepting the Riley or Carter. It is not more than half as productive as the Davis', but superior in quality for the table. It is white outside and inside, and shaped somewhat like the White Chenango (Mercer). This variety is quite early, being not more than a week later than the Chenango, to which it is superior. Should not consider it so profitable a variety for the market, except for early, as the above-named variety.

"Jackson White. A sort of recent introduction, and promises well. I have grown it two years with fair success, but have never had it dry and mealy as the State of Maine. This is a white potato, nearly round, medium size, eyes deeply sunk, fair as to productiveness and hardiness, worthy of trial.

"St. Helena. This is an old and well-known sort that was formerly cultivated in this region, but for some years has been neglected. It now comes out under other names, such as Laplander and White Mountain Seedling. It is a very productive sort, very handsome on account of its good size and whiteness. Quite free from the rot. This potato is apt to be soggy, and for that reason is not so highly esteemed."

A Mexican potato, said to have come from seed of potatoes found growing wild in Mexico, has been disseminated somewhat in Western New York, within the last dozen years; it is highly recommended as having a rich white flesh of good quality, with very smooth thin skin and shallow eyes. The tops or vines are remarkably small, and from this fact may be planted closer in hills than other varieties, or in drills three to three and a half feet apart and six inches in the drill. May be cut as small as a single eye on a piece, and set four eyes in a hill, one in each corner of a square of four inches. Six bushels will be sufficient to seed an acre of ground.

"Wing's New Mercers. Mr. Benj. Wing, of Rochester, N. Y., says the seed came from Vermont. They resemble the old standard Mercer in shape, but have much less of the blue tint in the meat and skin, being nearly white throughout. They have a smooth skin, and cook as white and as dry as the old Mercers. The vine is larger and more luxuriant; they grow as compactly in the hills, and have yielded fully 25 per cent. more than the old Mercers, on the same field, and with the same opportunities. They have been called in some instances Sherman's Seedling, or Seedling Mercers.

"The Keeper Blue is a Western variety of large size, round, with dark blue skin and white meat, and of excellent quality. A few planted as an experiment in Monmouth County attained only moderate size, with light yield, ripening rather late; but the quality of this product surpassed the original stock, being in every respect most excellent—equaling the famous Carter in its best days.

"The New Hampshire White, raised in Monmouth County, is a very large oblong potato, white throughout.

"The Wood's Seedling is similar in shape and size, with pale red skin mottled with white. Both yield very largely, but are not very good table potatoes.

"The yellow-meated, poor-flavored potatoes, such as Western Reds, Junes, Round Pinkeyes, English Whites, and Rock Whites, sell at prices 50 per cent. below the choice white varieties."

The State of Maine is a new variety lately introduced, and another from Maine, called the Poggy potato, both of which are highly recommended.

Alleghany potatoes is the name of a new sort, described as excellent and free from disease, by D. Edwards, of Little Genesee, N. Y.

The Wood's potato and Jenny Lind potato are described by John C. Polley, DeWitt, Clinton County, Iowa, as identical, and he gives the following as its history, which is valuable information, and proves that old things are sometimes sold at extra prices as something new.

"Isaac N. Wood, a farmer, living in Holland, Hampden County, Mass., in the fall of 1845 or 1846, gathered a few potato-balls from the vines of the Peach Blow potato, and the following spring planted some of the seeds. They grew feebly the first year, the tops bearing very little resemblance to those of potatoes. In the fall he harvested about two quarts, varying in size from that of a grape to a crow's egg. There were three distinct varieties in this first crop. The following spring he planted them in a sandy soil, and raised from one kind about ninety pounds, most of them of large size. The two other varieties yielded very little, and were not preserved; the former were carefully stored for seed. Their appearance the second year from the original seed was the same as it is to-day; and it seemed as mature then as it was after years of cultivation. It had the same rough appearance then that it has now; the eyes were numerous and deep-set. The next year he cut these ninety pounds of seed in such a way as to leave but one eye on a piece, and put three pieces in a hill. The hills were one and a half feet apart one way, and three and a half the other. Seeding in this way, he had enough to plant one fourth of an acre. The ground was dry and sandy, and highly manured. I saw them several times during the season, and have never seen a greater growth of tops than on that piece. It was impossible to tell, by the tops, which way the rows went, even while they were standing up, and before they were thrown down by the wind and their own weight. He harvested from that piece one hundred and thirty bushels of potatoes; some of them were remarkably large, weighing from two to three pounds. He used of this crop only enough to test thoroughly their quality. The next spring he sold them in small quantities to his neighbors for seed at an extra price. My father procured some of the seed, and raised them for many years, and always considered them a valuable variety, especially for feeding stock. They were not so good for table use as many other kinds; but they grew better toward spring, and perhaps at that season of the year they are on an equality with our best varieties. They will go further in seeding than any other kind I now remember, and yield much better than the average. I think them a valuable addition to the already numerous potato family."

The Woodbury Red, California, and Early June potatoes, in Litchfield County, Conn., Dr. Beckwith of that State says, "were not affected by disease. The Woodbury Red yields large crops, but the quality is coarse."

Mr. Sperry, of Bethany, Conn., considers Merinos, which are also called Long Johns, the most profitable potato. He has adopted the plan of planting potatoes only on poor soil, to avoid the disease. The drier the land the less the rot. Planted on straw between the ridges on corn-land they did well; also laid on the ground and covered four inches deep with straw; the yield was small, but the tubers sound.

Mr. Brown, of North Stonington, has tried White and Black Mercers, Peach Blows, Dovers, Californias; of these the last rotted the least and yielded the best. The Dover is a fine potato, but the yield is very small.

Mr. Sperry, of Cheshire, has abandoned the culture of the Mercers on account of the rot, and regards the Sand Lakes the best; they are prolific, and an excellent table variety. A peculiarity of this sort is that the tubers form on roots at a distance from the hill and fill the whole ground, and do not rot. His practice is to dig as soon as the tops die, and keep the tubers excluded perfectly from the light. He uses poor, worn-out land, with lime and plaster in the hill, and level culture.

Mr. Peck, of Chaplin, plants on old pasture grounds, using ashes in the hill, with uniform success. He regards the Dovers as the best potato now raised in Windham County. He has raised 75 to 100 bushels of Dovers per acre.

Gen. Pratt, of Rocky Hill, says: "The Scotch Gray was the common sort some years since, but of late English Whites, Pinkeyes, and White Mercers are the preferred kinds. Potatoes do best on corn-ground, which was well manured with the corn, the potatoes receiving in the hill a table-spoonful of ashes and one of plaster, mixed. In one experiment the potatoes rotted less upon ground purposely left full of weeds than where it was kept clean. The longer potatoes are left in the ground the better. The Mercer potatoes sell highest. Carter potatoes and Ladyfingers, and Dover or Irish crop potatoes are good, and the last named keep good till spring."

Mr. Colburn, of Union, says: "The kind known as Peach Blow potatoes was almost exclusively grown in the northern part of Tolland County, and gives it as his experience that early planting and flat culture are best. He plants as early in April as possible, and thinks that the crop of an early planting is less likely to rot. He disapproves the use of animal manure in the hill, and prefers to plant upon land manured the previous year, or upon sward ground, with ashes for a fertilizer."

849. **Importance of the Potato Crop.**—Notwithstanding disease, bad crops, and all other difficulties in the way of growing potatoes, the average yield per acre is at least one hundred bushels, and the average price in New York for years has been about equal to Indian corn, and sometimes as high as wheat, and twice as high as oats. They have often been so high that it was no object for a baker to use potatoes with wheat flour, and they have actually been retailed from the same store, pound for pound, with good wheat flour, at the same price. Under such circumstances, the importance of the potato crop will warrant us to devote some pages for its consideration. English and Irish farmers may well wonder at the statement of the price at which potatoes are sometimes sold at retail in this city; that is, at the rate of eight or nine shillings sterling a bushel of fifty-four pounds, and at this price they have been used as food in immense quantities for many years. Notwithstanding the great advance of price, the consumption has enormously increased, which may be attributed in part to the immense number of six hundred thousand immigrants annually. If we estimate that each individual uses but five bushels of potatoes, which is a moderate estimate, it will require three millions of bushels to supply this demand. The reason why this class use potatoes so largely is because they can be so easily prepared, and because the taste for other cheap food, such as corn meal, has to be acquired.

In September, 1861, when potatoes were considered very low-priced, owing to an abundant crop just coming on the market, the wholesale price was quoted at $1 12 to $1 50 per barrel, and the average quantity in a barrel is not over two and a quarter bushels, making them at the lowest 50 cents a bushel. At the same time wheat was quoted from 91 cents to $1 27 a bushel; rye, 67; oats, 28 to 34, Indian corn, 47 to 65, and good wheat flour for family use at $4 50 to $6 a barrel, say only three times the price of potatoes, with all their weight of water and waste in cooking. Who will doubt the importance of the potato crop in America at present prices?

850. **Some General Rules for Potato Culture.**—The first grand rule is, plow your ground—do not scratch it and call it plowed. We should prefer the Michigan plow, run twelve inches deep, with a subsoil plow following in each furrow, twelve inches deeper; and the potatoes planted and cultivated on the level system, the work all being done by horse-hoes instead of hand-hoes.

The best potato land is a dry, mellow loam. Do not select muddy soil or ground that was manured high last year with unfermented stable or hog-pen manure; and do not use either of these manures on the crop. Remember that soil as well as climate has much to do with the nature of crops. Gravel or loamy soils are best, especially when they contain a large proportion of vegetable matter. If potato-ground is well prepared, and then becomes packed afterward, it will not injure the product, but will increase it; treading the hills upon sandy ground will be beneficial. In planting, we would use medium-sized whole potatoes, dropped in furrows three inches deep, and fill the furrow with loose dirt, well beaten down.

For manure, use none but the very best compost or guano, thoroughly mixed with the soil. Use lime, plaster, and salt, one or all. Twenty bushels of salt or fifty bushels of lime per acre would not frighten the potatoes out of one year's growth; and a handful of plaster upon each hill would tell you a most interesting story. Freshly dug muck, taken from salt or fresh marshes, thrown into drills underlying seed potatoes, will be found to be an efficient manure, while the decomposition of this muck, consequent upon the abstraction of some of its constituents by the roots of the growing potato, prepare it for minute division in the soil by the next year's plowing, and thus sandy soils may be made to yield large crops of potatoes, at the same time providing themselves with the conditions which will render them retentive of manures for all time. Use salt and lime broadcast at the first or second tending, mixing with the soil by the cultivator. The plaster may be put on at any time after the vines are well grown. Sods or straw laid in the furrow over the seed are good, because they maintain an equal temperature beneath them.

The best aspect for a potato field is a northern one, as a southern heats too much, and an eastern heats too rapidly after a cold night. Seed potatoes we prefer to plant whole, because it is a law of nature that the tuber or seed furnishes food for the young plant. We would plant early, because early planting gives the plant a slow, hardy growth in the comparatively wet weather early in the season, which fits it to better withstand the sudden transition of midsummer. In Mississippi, potatoes are planted in November. We have planted in February north of New York city, and got a good crop of early potatoes. Early maturing sorts are the surest of late years. In the culture of potatoes it should be borne in mind that they are tubers; that the roots which are thrown forth never yield potatoes attached to themselves, the new growth always occurring on the stems, and hence the mode of culture should be such that after the proper number of tubers have appeared upon the new growing stem, no others should be induced, so that all the pabulum collected by the roots may be reserved for the use of the first formed tubers. If this rule be strictly adhered to, all the potatoes will be of full size, and we shall not have assorted crops, part large, part small, part ripe, and part unripe. As soon as the plants are three inches high, turn furrows toward them so that they will be partially covered, but do not make ridges. Keep your culture upon the flat system. Take care to keep the field clear of weeds, cost what it will, and you can grow potatoes in these latter days with more profit than you ever did in ancient times of great crops and low prices. There is no better implement to use between potato rows than a subsoil plow. Planting in drills we prefer to hills; level cultivation in preference to ridges; but the ground must be deeply prepared.

851. **Culture of Potatoes by the Plow without Hoeing.**—A Connecticut farmer is successful in the following mode of growing potatoes, doing all the work of covering with the plow instead of hand hoe: After plowing deep, he laid out the field with the plow for the seed, drawing furrows three inches deep, two feet and a half apart; in these were dropped potatoes fifteen inches apart. They were covered by throwing a ridge over each row, four inches above the general level—the potatoes therefore being buried seven inches deep. Ten days after the piece was cross-harrowed level, or nearly so, and then left till the rows could be distinctly seen; then the earth was again thrown in ridges, covering the potatoes; this was done by plowing twice to each row; then, the same day that which was ridged was harrowed flat, there being no more plowed than could be leveled before night. When the plants had attained a hight of six or eight inches, they were tilled either with Shares' horse-hoe or with a light plow, according to the soil (which in some parts was too grassy to use the horse-hoe to advantage); by this operation the potatoes were pretty well earthed up. Afterward the horse-hoe was used again as a weeder, and nothing more done, save to go through once and pull the few big weeds which were in the rows. The hand-hoe was used in a few spots only, where sods on the surface made it necessary. As the result of this mode of culture there were three acres of potatoes, and not a weed in sight.

852. **Growing Potatoes under Straw or Tan Bark.**—R. B. Bamford, of England, has issued a pamphlet, giving his method of using tan bark, which is briefly stated as follows: He does not cut his potatoes, but uses the largest he can select. The rows are thirty inches apart, and the potatoes are put nine inches from each other in the row. The land is plowed only eight inches deep. He treads the manure firmly in the furrows, puts in the tubers, and covers them in with tan refuse, nine inches deep. In 1857 he

raised six hundred and seventy-five bushels of potatoes to the acre, with nothing but waste tan as a covering, and not a rotten one among them.

A similar thing has been practiced with straw and with swingling-tow. J. M. Smith, of Beaver County, Pa., recommends raising potatoes under straw. Plow the ground and manure well. Cut the seed and drop in squares two by two and a half feet on the leveled surface, and cover with straw six inches deep. The crop was large and potatoes good, when all around, potatoes planted in the usual way made a poor crop.

Another farmer says: "Prepare the ground well and plant in drills and cultivate once after they grow, and then, while the surface is fresh, cover eight inches deep with straw."

853. **Ashes for Potatoes.**—Rufus Brown, of Chelsea, Orange County, Vt., says that in an experiment tried by him, the gain in the crop of potatoes by the use of ashes at the rate of a teacupful to the hill was about a bushel and a half of potatoes for each bushel of ashes used. The kind of potatoes was the English Pinkeye, and yield two hundred bushels per acre. The ground was planted May 7th, with the ashes in holes and a little dirt over them. It was plowed and hoed June 18th, the rows being four feet apart and hills three feet. The ashes cost twelve and a half cents a bushel, and potatoes sold at thirty-five cents, returning full fifty cents a bushel for the ashes employed.

854. **Hoeing Potatoes when Wet.**—A correspondent of the *Prairie Farmer* states that, having noticed how potatoes, when interrupted in their growth, invariably pined away and died, if disturbed and bruised when wet with dew or rain, he tried the following experiment: He selected a patch in his potato-field, had it plowed only once, and then loosened the soil with the hoe when the stalks were above ground, and in the heat of the day when they were dry. He never touched them afterward until they were dug in October. These stalks kept green, and the yield of potatoes was very large. The other portion of the patch was worked three times, when the stalks were wet with dew. These blighted early, did not produce half a crop, and that of an inferior quality. The ground, seed, and time of planting in both cases were the same.

855. **Practical Opinions about Seed Potatoes and Planting.**—Isaac Beckner, of Goshen, Ind., gives the following as his plan, by which he gets a good crop of sound potatoes: "Plant sound seed three and a half by three and a half feet; work them with a small cultivator until they are ready to lay by, and then run a furrow in the center of the middle as deep as you can with a shovel plow, twice in the same place each way, forming a fine hill. These furrows will drain the hills if too wet, and if it is dry, the hill is in a good shape to retain the moisture. In this way of tending they will need no hoeing, as they will be hilled sufficiently."

Another farmer prefers drilling the seed. He says the average yield is twenty-five per cent. greater.

Another one not only plants in squares, but is particular to have each piece of seed in its proper place relative to position. After preparing the ground and marking each way with a plow, he marks a place for each piece of seed with a block having four pins inserted at equal distances. Small children may follow and drop one piece in each hole, which may then be covered with the hoe or rake. By this method your potatoes are neither too compact nor carelessly dropped out of place. The after-culture is more pleasantly and nicely performed, on account of every plant standing just where it should be.

Another recommends planting the seed very deep, and proves his theory sound by seed accidentally buried very deep, always producing well, and the potatoes never rotting. He says: "Potatoes planted near the surface are affected by the changes of the weather; the blistering sun and drenching rain contribute in no small degree to their decay, while those deeper planted are protected from the extremes of heat and cold, of wet and drouth."

General Beatson, of the British army, who commanded at St. Helena, at the suggestion of the Royal Agricultural Society tried a great number of well-directed experiments in relation to the culture of the potato. He found that the proper depth to which the seed should be covered was six inches; that at a greater or less depth of covering the crop was less and of inferior quality. He also found that the largest and most perfect potatoes, when used for seed, would give a larger yield from the same number of pounds than any other size. He tried them of every size, at every depth, whole, cut in various sized pieces, the different portions of the potato planted separately, the removal of the eyes from the potato, and their separate planting, and the result of all these experiments was that the largest-sized potatoes covered to the full depth of six inches, with flat cultivation and continued disturbance of the surface of the soil would yield the largest crop. Each of these experiments, even in its subdivisions, occupied a space of not less than one acre.

856. **Cut Seed vs. Whole Potatoes.**—There are conflicting opinions as to which is best, planting potatoes whole or cut, or whether large or small ones are equally good for seed. We give some of these opinions as we find them: our own corresponds to that of General Beatson. The following is a statement of Professor Nash: "Nothing can shake my opinion in favor of planting large tubers. The want of proper food in the soil is often, if not always, the cause of the potato rot, as well as poor crops. A mixture of four bushels of wood ashes, one bushel of shell lime, one half bushel of plaster, one quarter bushel of salt, produced an excellent crop, while, right alongside, a crop without this mixture was not worth digging."

A letter from Cayuga County, N. Y., contains the following statement: "For twelve years past we have been in the habit of selecting potatoes for seed the size of a black walnut, putting one in each hill, and during this time have not had as many as one in fifty affected with disease, except one season, when digging in wet weather, we washed them before they were carried to the cellar, when they rotted at the bottom of the heap. We have usually planted the kind called *Dooryard* or *Wigdons*, and on the same ground, year after year, manuring once in three years. Other varieties have also done well for us with the same treatment, though the rot has been so prevalent in the neighborhood. As to cutting out eyes of potatoes to plant, it is only a theory that may succeed, but it is not according to the laws of science. I therefore contend for planting whole potatoes. Cut potatoes are more liable than whole ones to become diseased. With regard to planting small potatoes, I have proved by experiment that small tubers of the size of English walnuts will produce as good a crop as larger ones."

On the contrary, John G. Bergen (a Long Island farmer) says: "I have always advocated cutting potatoes, and my experience has always sustained the theory. True, the circumstances of all experiments may vary the result. My experiments have produced me the best crops of marketable potatoes. If a potato is cut in the sun or dry atmosphere, a skin immediately forms over the cut part. I have not tried cutting out the eyes, but I do not see why they may not produce as well as from whole tubers. As to the size of tubers, I tried a bushel of the largest, and found that they were earlier and produced a better crop. The best farmers make three sizes, rejecting the smallest, and plant sizes together, and find that they ripen more evenly, and the largest end always ripens earlier, whether cut or not. This is an object with gardeners who grow potatoes for market, and find it an object to get the crop very early—a few days making a great difference in price."

Here is the statement of a Michigan farmer, which exactly coincides with our own experience: "On the 30th of April, 1851, I planted, on one square rod of ground, in seventy-two hills, seventy-two small potatoes, from the size of a hickory nut to that of a hen's egg. The seed measured about two quarts, and weighed three and a half pounds. To plant an acre in this manner would require ten bushels of seed. On the same day, on a square rod adjoining, I planted seventy-two large potatoes, in seventy-two hills, placing one in each hill, without cutting. The seed measured more than a peck, and weighed fifteen pounds. On the 20th of August I dug both patches. The product of the small potatoes was five pecks, weighing eighty-four pounds, which would give a yield of two hundred bushels to an acre. The product of the large potatoes was one hundred and fifty-eight pounds, measuring nine pecks, which would give three hundred and sixty bushels to the acre. The vines averaged four to each hill, while those of the small potatoes were only three. The vines from the large potatoes grew much faster and larger than the other, but in the size of the potatoes there was no great difference.

Prof. Mapes says: "I tried the experiment of cutting out the eyes for planting, with a gouge. These were planted, after being rolled in plaster or partially dried, and the potatoes were used as food. I found that the eyes of one bushel of potatoes occupying the same amount of ground, and all other circumstances being equal, planted alongside of a bushel of whole potatoes, would yield the same number of potatoes, but not of the same weight or size; their keeping properties were not so good, and they were more early attacked with disease."

The following are brief opinions of Connecticut farmers: Mr. Sperry, of Cheshire, prefers seed split lengthwise.

Gen. Pratt thinks cut seed better than whole—he cuts in two or three pieces, and thinks small seed will eventually deteriorate the crop.

Mr. Sperry, by planting small seeds, obtains the largest tubers. He thinks too much seed is generally used.

Mr. Colburn sees no difference from whole or cut seed.

Mr. Brown prefers tubers the size of an egg, and four stalks in a hill. He sometimes plants chits instead of whole seed.

Mr. White, of Manchester, cuts an egg-sized potato in four pieces, and uses but two in a hill, planting $3\frac{1}{2} \times 3$ feet, or 3×3, upon pasture land, without manure, using plaster after hoeing.

An advocate of cut seed says: "We do not need many sprouts in a hill, and we do not get many, however many eyes we plant. If we plant whole tubers, one vigorous stalk grows, and we get the same result from a single eye. I would never plant cut potatoes without first rolling the seed in lime, or something to dry up the juice."

Our own opinion we give in conclusion as follows: for seed, we should use medium-sized tubers—less than is usual in the hill. If the stalks are abundant, invariably they are not vigorous, and produce small potatoes and a poor yield.

The seed-end of potatoes, we have no doubt, is equally valuable as any other part for planting, if cut so as not to have too many eyes and sprouts huddled together; yet we have known some over-nice planters cut off and throw away the seed-end as worthless, just as some do the but-ends of ears of corn, without being able to assign the reason wherefore. We are in favor of planting potatoes in drills, as well as almost every other farm crop. To sum up: Plant potatoes on dry land, deep plowed and subsoiled, manured with compost in the drill, or covered and mixed with all the surface-soil with a cultivator harrow. Plant medium-sized tubers in medium quantities if whole; or cut so as to divide the eyes equally, and take pains to drop them carefully and with regularity.

857. **Accurate Experiments with Large and Small Seed Potatoes.**—K. K. Kenny, of Lorain County, Ohio, says: "About the first of May I made a small piece of ground very mellow, and planted it with care in the following order:

"1. Two rows, of six hills each, with pieces from medium-sized tubers, each piece having one eye, and four pieces in a hill. 2. Two rows, with whole medium-sized tubers, one in each hill. 3. Two rows, with eyes having very little of the tuber attached, four in each hill. 4. Two rows, with small tubers, four in each hill. 5. Two rows, with eyes from the seed-end of each tuber. 6. Two rows, with eyes from the stem-end of the large tubers. 7. Two rows, with small, unripe tubers, taken up while quite green, on purpose for trial.

"At digging-time, the following was the result:

No.	Weight of seed. lbs.	oz.	Average No. of tubers in hill.	Av. weight in 12 hills. lbs.	Yield per acre. bush.
1	1	9	9	28¾	150
2	3	1	10½	30	160
3		5	8⅔	24	128
4		14	15	31	165
5	1	2	10½	34	192
6	1	12	12½	42½	218
7			5½	27½	146

"I do not suppose that the same result would always be obtained, but this being from actual experiment is of some little value. Those who advocate the planting of eyes, as in No. 3, usually dry them. Mine, however, were not dried, but planted when newly cut. No. 7 would probably compare better in a dry season; the vines were altogether more vigorous, and apparently more healthy. I also drew some young vines, as is usually done with the sweet potatoes, and transplanted them. From these I obtained beautiful tubers of nearly equal size. This suggests the idea of forcing the potato in a hot-bed, and transplanting when all danger of frost is over, thus securing an early crop. The variety used was the Nishanock."

858. **Planting without Plowing.**—The following item of information, we think, must be looked upon as a valuable discovery by a tolerably large class of American farmers, who are habitually behindhand with their spring work.

We can not say that we are entirely satisfied that planting without plowing is worthy of commendation or adoption by those who can and should do better. Our informant says: "The best, or next to the best, crop of potatoes he ever saw was raised by a neighbor whom he saw planting on old corn-ground, by merely pulling over the stubs of corn and dropping a potato in the hole, and then crowding the corn-hill back and stepping upon it. The land was not plowed to begin with, but after the planting treated as usual. No manure was used, and the potatoes (pinkeyes) were the largest and best he had ever seen."

Upon mellow land, where the corn had been manured in the hills, and in cultivation hilled up, it is possible that the result might be as above stated, if the ground between the rows was afterward deeply and thoroughly plowed both ways.

859. **Planting Potatoes from Sets.**—A farmer who has long practiced growing potatoes from sets, gives the following directions: "Put the seed in drills just wide enough apart to hoe between, and when the sprouts are up four or five inches, draw them and transplant where they are to grow, three sprouts in a hill. My second crop, May 26, is now nearly ready for transplanting. This method has many advantages over the old one, especially as the young plants are as hardy as cabbages, and can be planted with as much speed as tubers. One bushel of seed goes as far as ten in the old way.

"You can have your ground fresh plowed at the time of transplanting, and thus get a good start of the weeds, and no small potatoes; they are of uniform size."

860. **Planting Potatoes in Autumn.**—Egbert Lanpher, of West Lowell, Lewis County, N. Y., says he has successfully tried the experiment of wintering potatoes in the hill where they are to grow. He thinks it also a great preventive of the rot. He says: "I cleared a piece of new mucky land, and planted two bushels, and hilled them, so that they did not freeze during the time that the ground remained bare of snow. The next spring I planted on the same kind of land, by the side of those planted in autumn. Those planted in autumn remained green two weeks longer than those planted in the spring. I saved the crop, and used them for seed next spring. I put them up in pits or small holes, from three to seven bushels in each, not piling them over one foot thick, so that they would not heat each other; and now I have from last year's crop as fine potatoes as any man ever need wish to eat. My belief is that potatoes should be planted *in the full of the moon*, as early as they can be planted in the spring, and remain undug as long as possible, and those intended for seed should be mixed with dirt, through the winter; they never should be put in large piles."

All this we agree with except the moon part of the story. It is a curious fact that in the year 1860, in a country boasting of its enlightenment, men of fair intelligence and good sense in other matters should still cling to that antiquated and thoroughly exploded old notion that planting potatoes "in the old of the moon" could, by any possible chance, have any effect upon the crop.

Another person says: "With a view to obtain new potatoes earlier than by the usual process of spring planting, I prepared a small patch in my garden, as follows:

"Dug trenches nine inches deep, two feet and four inches apart—strewed on the bottom long stable manure—set Early Junes, whole, eight inches apart; then another layer of long litter, fresh from the stable, and filled up with four inches of soil. All this, November 18th.

"As soon as the surface froze hard, I spread a light layer of straw. The sprouts appeared above ground on the 4th of May. Dug between rows, and planted Early York cabbages. On the 26th of July dug potatoes, leaving cabbage almost headed. The yield was good, but as an early crop the attempt was a failure. Potatoes of the same kind planted on the 3d of April came up and matured ten days earlier."

861. **The Roberts, or Michigan, Theory of Wintering Potatoes.**—A few years ago, a new theory about potato seed was promulgated by a Mr. Roberts, of Michigan, which attracted much attention, and as it is a very reasonable one we put it upon permanent record. It is simply to let the seed remain as the tubers grow in the ground, by which they seem to acquire vigor and hardihood to resist any killing effects from bugs or any other blighting cause.

His plan is certainly worth a trial, as the quality of the potato is undoubtedly improved by the process. The following is Mr. Roberts' plan in detail:

"Select one fourth acre of arable land, on which water will not stand, on an eastern slope (new land is the best for this use), prepare it early in the spring, furrow four or five inches deep and two feet apart. Select seed roots that are about the size of a hen's egg, that have touched the ground during the previous winter. Do not cut them; drop one every six or eight inches apart in the furrows; cover them by filling the furrows, and then put a top dressing of two inches of straw or forest leaves on each row. When the tops are two inches high, pass between the rows with a shovel-plow; follow with a hoe, destroying the weeds and leveling the ground; do not hill. Do nothing more until the ground begins to freeze; then cover with half-rotten straw, chaff, or forest leaves, three or four inches deep. Your potatoes will now have a chance to ripen and rest during the winter.

"The spring following, dig your potatoes, and plant a field crop for culinary use in drills four or five inches deep and three feet apart; drop a potato every eight or ten inches, cover by filling the furrows; cultivate or hoe twice, and plant another seed patch as above directed. In this way you will get the greatest yield and best quality. Continue a similar practice from year to year, and judging from my own experience, I believe you will find your potatoes yearly increasing in yield and quality.

"The third year you may increase your field crop by plowing in fine manure. You have now had nature's course pointed out to you; her laws are truths; and I humbly believe I have given them a just exposition. All who follow my directions will, the second year, see many seed-balls on the vines. Seed of every variety should be fully matured, *i. e.*, not harvested until fully ripe. That which approaches the nearest to perfection should be selected for seed, and all roots for seed purposes should remain in the ground where they grow until they bear seed; this course will make the seed mature earlier, and make it the most perfect of its kind."

862. **Storing Potatoes in Winter.**—There is no better way than covering potatoes in piles to preserve them through winter, care being taken not to cover them too warm, nor so shallow as to endanger freezing and thawing. They will bear freezing once slightly without injury, if thawed in the earth. Put about twenty bushels in a pile, on a smooth spot where no water can reach the bottom of the pile, and cover six or eight inches deep with straw and a little earth, making it a foot thick and compact, before the ground is frozen, and outside of that put a coat of litter, and hold it on with a few shovelfuls of earth, or some brush, or poles, or boards. If much warm weather occurs after the heap is covered, it must be ventilated. This may be done with a wisp of straw extending through the earth covering.

When potatoes are stored in a cellar, we recommend them to be put in as large bodies as possible, in the darkest part of the cellar. Potatoes never should be exposed to the light; and they never should be heated in the sun. They should be stored cool, as fast as unearthed, in cellar or piles, where they are to be kept through the winter, and at once covered from the drying winds and light. It is not important that potatoes should be stored dry. Taken from the field in a rainy day, in a muddy condition, they have kept well. One man dried his potatoes in the sun, and stored them warm. In a few days the pile was steaming and the center in a state of decay. His remedy was to spread them out upon the cellar bottom to cool, and sprinkle gypsum, two bushels to a hundred bushels of potatoes, which gave them the condition they would have had if stored on a damp day. Potatoes would keep better if buried with earth, filling all the interstices between the tubers, keeping them cool and dark. That is the great secret in storing potatoes.

863. **To Keep Potatoes from Sprouting.**—"To keep old potatoes from growing, use boiling water, in a tub, with as many potatoes as the water will entirely cover; then pour off the water, and lay up the potatoes on boards, in a dry place, only one layer deep."

In Scotland, "diluted ammoniacal water, in the proportion of an ounce of the liquor of ammonia to a pint of river or rain water, has of late years been successfully employed for checking the vegetative power of potatoes and prolonging their suitableness for food. Potatoes immersed four or five days in this liquid retain all their edible properties unimpaired for a twelvemonth, improved in flavor and mealiness. The effect of the liquid is to consolidate their substance and extract their moisture. After immersion the potatoes should be spread so as to dry."

864. **Cost and Mode of Growing Two Crops of Potatoes.**—The following statements show the cost of growing crops of potatoes on Long Island. John McKunn, of Gravesend, says: "My ground was plowed deep, mellow, and furrowed two and a half feet apart. I then sprinkled three hundred pounds sifted Peruvian guano in the bottom of the furrow, and on top of the guano four loads of stable manure, and then, after cutting thirteen bushels of potatoes to two eyes, dropped them fourteen inches apart on the manure, and covered three inches deep. As soon as they were well up, I plowed and hoed them, and twice afterward, and then fastened a wooden mold-board six inches wide upon the top of the iron one, extending ten inches back of the plow, so that the dirt was thrown quite up to the vines, covering all weeds. This comprises the whole labor of cultivation:

Cost of plowing, per acre	$2 00
Cost of planting, per acre	3 00
Cultivating the same	3 00
Cost of 13 bushels seed, at 50c. per bushel	6 50
Cost of 300 lbs. of guano, at 2¾c. per lb.	8 25
Four loads stable manure, at $1 per load	4 00
Digging 245 bush. potatoes, at 6c. per bush.	14 70
Total	$41 45

—245 bushels potatoes sold for 50 cents per bushel, $122 50.

"The variety was Red Cups, a fine potato, cooking white and dry. Potato-ground I sow with wheat, and seed it down with grass, using a small addition of manure, with a fair prospect of a good crop."

John G. Bergen, also of Long Island, under date of August, 1860, gives the following statement of result of planting seven acres of potatoes—expenses—mode of cultivation—crop—marketing and proceeds, gross and net. Location, Eighth Ward, Brooklyn. Soil, sandy, sandy loam, loam, clay loam, clay and gravel with all shades of admixture. Land all manured before plowing with a broadcast application of either New York city street manure or seaweed. Variety planted, Dikeman, except three quarters of an acre Mercers. The plowing and planting all done between the 9th and 26th of March; the planting between the 15th and 26th of March, inclusive. Depth of plowing, eight inches, except one quarter of an acre subsoiled to the depth of sixteen inches. The crop dug and sold between the 2d of July and the 1st of August, 1860. Vines exceedingly green and potatoes about half grown when digging commenced, and, with the exception of about a half acre of the last dug, the vines continued green. Crop 1,590 bushels prime potatoes, 85 bushels culls, and 26 bushels small, hog potatoes; total 1,701 bushels. The crop would probably have been increased 25 or 33 per cent. if all the potatoes had fully matured before harvesting. The yield was 243 bushels to the acre. Amount sold, $1,190, or $170 per acre. The ground since all planted with second crops.

The potatoes before planting were all cut from two to six pieces, depending upon size, and were planted in drills—the drills were three feet apart, and from three to four inches deep—the sets were placed about fifteen inches apart.

Well-rotted horse and hog manure was placed in the drills and the seed placed on the manure. The potatoes and manure were covered with a small one-horse plow running it on both sides of the drill, throwing up the ground in the form of a ridge over the drill. When the sprouts were within two inches of the surface, the ground was dragged nearly level with a light wooden-tooth harrow. As soon as up, the potatoes received a light dressing with the hoe without hilling, having previously been plowed from the hill with a small iron mold-board plow, run twice through the row. When about six or eight inches high the plowing was repeated, reversing by throwing to the hill. This was followed by another light hoeing, without attempting to raise up the ground to the vines, the plowing, however, having the effect to hill up to some degree. A few days later, before the vines closed up the rows entirely, a small cultivator was drawn once through every row. This process left the land almost entirely free of weeds, at the time of digging, which was all done with the potato-fork. All of the ground was cropped the previous year—most of it being sod or grass land. The potatoes when dug were at once picked up in baskets and sent to Washington Market.

Some abatement may be made in the number of bushels, as the cultivation is based on three bushels to the barrel, which is above the true measure.

EXPENSE PER ACRE.

17 loads manure to the acre—broadcast—at $1 per load	$17 00
Cost of cartage and spreading manure	6 00
12 loads horse and hog manure to the drill, at $2 25	27 00
Team and men to apply the manure	4 00
12 bushels seed and preparing it for planting	10 00
Plowing, harrowing, and marking out ground	4 00
Two hoeings—4 days for one man, at 75c.	3 00
Dropping potatoes and covering with horse and plow	2 50
Plowing between drills; harrowing ridges down with wooden-tooth harrow	$3 50
Digging, at 4½ cents per bushel	10 93
Carting to Washington Market and ferriage and loading	10 00
Commission for selling $170, 10 per cent.	17 00
Total expense	$114 93

Amount sold per acre	$170 00
Direct expenses	114 93
Apparent profit	$55 07

The potatoes were dug by contract per bushel; they might have been gathered much cheaper by ordinary farm-laborers employed by the month and boarded by the proprietor.

No allowance is made for interest of value of land, and of the other capital employed in producing the crop, and the wear and tear of implements, baskets, etc.

The land, after a potato crop is taken off, is left in better condition than before—the second crops receiving no additional manure, except sometimes a light application of guano.

865. **Experiment in Planting Potatoes Various Depths.**—*Variety, Mercer; planted May* 12, 1859. *Dug September 7th. Vines dead since the middle of August. Planted one moderate-sized potato to each hill, and manured alike in hills. Yield reported by John G. Bergen, of Brooklyn, as follows:*

	lbs.	lbs.	lbs.	lbs.	Average.
2 hills, 2 inches deep—each hill weighed separately.........	..	2	¾	..	1.375
3 hills, 3 inches deep—each hill weighed separately.........	..	1½	1	1¾	1.416
2 hills, 4 inches deep—each hill weighed separately.........	..	1¾	2	..	1.875
3 hills, 5 inches deep—each hill weighed separately.........	..	1½	1	1	1.166
4 hills, 6 inches deep—each hill weighed separately.........	2	1½	1¼	1¾	1.625
4 hills, 7 inches deep—each hill weighed separately.........	1¾	1½	1½	1	1.4375
3 hills, 8 inches deep—each hill weighed separately.........	..	1¼	1	¾	1.
3 hills, 9 inches deep—each hill weighed separately.........	..	1½	1¼	¾	1.166
3 hills, 10 inches deep—each hill weighed separately... ..	..	1½	1	¼	1.25
3 hills, 11 inches deep—each hill weighed separately........	..	1	1¼	1½	1.25
3 hills, 12 inches deep—each hill weighed separately........	..	¾	¾	1¾	1.083
4 hills, eye-end cut, one piece, 5 inches deep, 5½ lbs.					1.375
4 hills, middle cut, one piece, 5 inches deep, 5 lbs.					1.25
4 hills, stem cut, one piece, 5 inches deep, 4¼ lbs........					1.062
2 hills, one potato each, with plaster, 5 inches deep, 3¾ lbs........					1.875
2 hills, one potato, plaster and ashes, 3¼ inches deep, 3¼ lbs........					1.625
2 hills, one potato, ashes, 5 inches deep, 3¼ lbs........					1.625

"It will be observed that the best results followed the 4-inch plantings: and next in order, 6-inch, 7-inch, 8-inch, and 2-inch; while 5-inch, which is between these numbers (and which I think is the right depth for our soil), produced less than any, until we reach the 8-inch plantings. The results are not uniform; for instance, one hill, 12 inches deep, produced 1¾ lbs., which is larger than the average of any except the 4-inch planting; and so with other individual cases. The experiment is not conclusive, not being made on a sufficiently large scale, though carefully made. The yield was light in every case, but this was from other causes, and does not affect the general result. In all experiments of this kind, the size and quality or condition of the seed should be as near alike as possible. I deduce from these experiments, and from observation, the following, as bearing on this question:

"*First, Time.*—The depth of planting potatoes should be varied according to the time of planting, and possibly according to the character of soils. Early planting, except to protect from freezing, requires the least depth.

"*Second, Variety.*—Those that mature early require the least depth. The habits of varieties differ, and the treatment should vary accordingly.

"*Third, Season.*—Much depends upon the season, whether wet or dry, or medium. This can not be known beforehand, and hence a medium depth should generally be adopted. This, for early varieties planted early, and which generally mature on Long Island soils before the crop is severely affected by drouths, should not be over three or four inches, and for later varieties from five to six inches."

866. **The Potato Disease that Causes Rot.**—We will not inflict the reader with a homily upon this over-written subject. Neither cause nor cure of the disease has yet been discovered. The signs of the disease usually are: A wilted leaf on the young rosettes of the plant, which are the tenderest parts; steel-blue points on some of the older and outer leaves, and yellow iron-rust stains on the inner leaves; mildew, which quickly follows these signs, and which, if not arrested, kills the whole plant. These signs are produced by cold and wet weather and hot, muggy atmosphere. In cool weather, the flowers fall without setting fruit; in hot and damp weather seed-balls set freely, but, with the whole plant, fall a prey to mildew. The only remedy is to cultivate as well as we know how, choosing new and hardy sorts of potatoes, plant early, and trust to chance for the rest. The mowing of tops has been tried over and over again, sometimes with success and sometimes the reverse; and so have other remedies, each of which has in turn been proclaimed a specific. A prize essay in the Royal Society's Journal for 1858 gives us to understand that deep planting is the true and only remedy; and yet we have planted deep—and so have thousands of others—and lost the crop.

It is said that very wet, cold seasons, such as 1857, or hot, damp ones, like 1850, 1851, and 1855, cause rot; so do sudden alternations of temperature—for instance, from dry, hot weather to wet, cold, and windy; and these changes destroy the cucumber, squash, melon, tomato, and egg-plant as well as the potato. The years 1847, 1848, 1854, 1858, and especially 1852, were favorable ones.

If we plant in drained lands, or upon ridges where the water will not stand, the crop will rot less than in wet ground. The theory is that warm rains and a scalding sun produce the rot more than any other one cause. This theory is equally untenable with the thousand-and-one others. There is no cure for the disease—there are preventives. The one most easy of trial is early planting, dry soil, no stable manure, but other fertilizers, such as well-rotted swamp muck, or compost, lime, salt, plaster, phosphate, guano, potash, or wood ashes. It does not answer to allow vines to be so late that early frosts find them still green. Unfermented manure produces late growth of vines, and this as well as wet ground and late planting, leaves the vines green and liable to the influence that kills the tops and rots the roots. As preventives, use seed of hardy varieties, planted early on dry ground, hilling-up to shed rain, and sow plaster, lime, and sulphur on the tops. Lime on carbonaceous soil has the effect to make the vines less succulent and more hardy, and that may account for its prevention of rot on such soil. After all the discussion, we know nothing about the potato disease; but if we plant early we are more likely, or at least so far have been, to get good crops. Yet this may fail. Another point of a practical nature is this: that if we prepare our ground well, and feed it such ingredients as the crop needs, we are more sure to get a good crop than by the opposite course.

The theory that the disease of potatoes is caused by insects has been advocated as a fixed fact. One writer says: "A little black bug, not much larger than the head of a pin, leaves an almost undiscoverable substance on the potato leaves, which turns black and kills the vines, and the rot of the tubers follows." He thinks some bug deposits a poisonous substance upon other vegetables, injuring them very much for food.

Another one says: "The potato rot is unquestionably caused by an insect, resembling both the musketo and the common house-fly, which deposits its larvæ in the stock near the ground, and which does not make its appearance before August and September. It passes over some entire fields in the same neighborhood, some hills in the same lot, and some stalks in the same hill. The weather has no effect except to quicken the activity of the insect or to hasten decomposition after it has commenced."

"Unquestionably caused!" Is it? Let us see. Dr. Asa Fitch is good entomological authority. Now hear how he upsets this unquestionable cause. He says:

"The cause of the rot is supposed to be an insect, and numerous experiments are given to confirm this view; the insect itself is described at length. Its name, with the spelling corrected, is the *Phytocoris lineolaris* of Beauvois, and is supposed to be identical with the insect described by Say as the *Capsus oblineatus*. Now if the theory that the potato rot is caused by this insect is correct, there are these difficulties, which must occur to any one acquainted with entomology:

"1. The insect referred to has always been known in this country, and was probably quite as numerous fifty years ago as it ever has been since. From the earliest times the farmers have found it infesting their potato fields, and have consequently given it the common name of 'the potato bug.' Why did it never cause the rot until so recently?

"2. The insect referred to has never infested Great Britain—the only examples of it seen there, so far as we can ascertain, having been carried thither as curiosities in collections gathered in this country. Why did the potato rot appear there? Could the devastations of the insect in the crops of America have caused the rot that carried off all the potatoes in Ireland one or two years before?"

The disease that causes the potato rot is not a new one. A friend sends us the following "extract from a German paper," which says that "potatoes were first introduced into Europe in 1583; fifty-nine years afterward the rot commenced; eighty years after its introduction no good seed was to be had. In 1696 new seed was imported from Peru; forty-five years after this the rot again commenced, and in 1779 no good seed was to be had. In 1797 new seed was again imported, and it did not get into general use until 1802 or 1803."* If this is a fact, it should be fully proved, and that would prove the necessity of frequently renewing the seed from the original locality.

867. **Substitutes for Potatoes.**—Must we give up the cultivation of the potato? And if so, what will be the substitute? This is a question worthy of consideration; for although we do not believe that we shall give up their cultivation, we may discover something else worth trying—something which may prove valuable as a farm crop. Already we have had the Chinese yam introduced and grown to some extent, and talked about being grown to a very large extent. Several varieties of lotus have also been proposed as food plants.

868. **The American Lotus as a Substitute for the Potato.**—The *Apio* or *Ovate Aracacha* having been named as worthy of attention as a food plant, a correspondent of the *Homestead* names "the *Nelumbium lutenum*, or great nut-bearing lily, which, in his estimation, surpasses all other aquatic plants of the United States in beauty and utility. It grows abundantly in the shallow and stagnant waters of our Southern and Western States, and has been found flourishing as far north as the bays and inlets of Lake Erie. It is properly the lotus of North America, yielding a collection of tubers, much like the sweet potato, at its roots under the water, and also a liberal supply of nuts at the top of its stem. The nuts are all ripe at the same time, are about the size and color of medium white-oak acorns, so that they might easily be mistaken for them. The nuts are used as food like the chestnut, and are a valuable substitute for coffee. The writer has gathered twenty-one perfect nuts from a single stem. By the extensive culture of this noble plant many of our pestilential pools and marshes, instead of exhaling poisonous malaria, will at once become fountains of life-giving fertility."

869. **The Dioscorea Batatas or Chinese Yam as a Substitute for Potatoes.**—The degree of success in the cultivation of this root as a substitute for potatoes has been very widely different, some condemning it as a worse humbug than "Rohan potatoes," while others have lauded it so high that it has created doubts of their veracity and its value. In No. 564 we have treated it so fully that we need add but little under this head.

A letter from M. D. Darnall, Bainbridge, Ind., January, 1858, says: "In the spring of 1856, I obtained five small tubers or seed bulbs. These were carefully cultivated, and in autumn I had five hundred tubers and eight large roots. I planted next spring eight hundred hills, and raised sufficient tubers and large roots for planting one hundred thousand hills. I have two bushels of tubers, which are not much larger than full-grown marrowfat peas; and over one thousand large roots that may be divided into from fifty to one hundred pieces each, capable of germinating. The tubers are raised by cutting the vines and planting the leaves in July and August. My roots vary in length from fifteen to thirty inches, and from one half to two inches in diameter. I have had them cooked in several ways, and find them to possess all the qualities that have ever been claimed for them."

870. **Sweet Potatoes—Where they can be Grown.**—We can well remem-

ber when this plant, the *Convolvulus batatas*, was considered as much a Southern production as cotton is now, and when the commercial designation was "Carolina potatoes." It would then have been considered foolish to attempt to grow sweet potatoes north of latitude 40°; now it is quite common, though not generally as a field crop. They are raised very extensively along the eastern shore of the Delaware, on the light sandy soil that extends thirty miles southward from Camden. The principal markets are Philadelphia, New York, Boston, Wilmington, Delaware, and Baltimore. The varieties cultivated are Nansemonds, Early Yorks, and Bermudas. The first-named grows large, long, and rougher than the second, yields abundantly, but does not suit the Philadelphia and Wilmington markets as well as the Early Yorks, which are marketable earlier, and grow more smoothly and compactly, and are the most generally cultivated. The third, a new variety, received from Bermuda, of a light red color, coarse and rough, is inferior to the first two for the table, but attains a marketable size earlier than they do, and produces a much larger yield. The isothermal position of this valuable plant has been gradually advancing, until it is now difficult to say where its northern line is or will be.

O. S. Murray, of Warren County, Ohio, who is an extensive propagator of sweet potato plants, says: "Sweet potatoes can be grown successfully in much higher latitudes than has heretofore been generally supposed. They have already been produced, well matured, in Western, Central, and Eastern New York; in Connecticut, in New Hampshire, in Addison County, Vermont, nearly as far north as the center of that State. In Iowa they are raised to considerable extent, and something has been done with them in Wisconsin. I have been a successful cultivator of sweet potatoes a dozen years in Southern Ohio."

Messrs. Eastman & Snell, of Maineville, Warren County, Ohio, say that a crop will grow and yield well in any ordinary dry soil, provided it is well pulverized with plow and harrow; and whether the ground is old or new, a light coat of well-rotted manure is preferable. If the soil be very strong, the vines will be large, but the yield of tubers indifferent.

Warren County is situated upon the high lands of Ohio, back of Cincinnati, between latitude thirty-nine and forty degrees, where the soil is no more favorable for growing this excellent food than it is in a great many other places in the same range of latitude in which sweet potatoes can be grown with profit to the cultivator, and as they can with pretty fair success up to forty-one degrees, the latitude of New York, and with varying success one or two degrees above that.

The best variety for the North is called the Nansemond, from the name of the county in Virginia whence it was taken to New Jersey. Joseph Evans brought it into Warren County, Ohio, many years ago, where it has been successfully cultivated ever since. One peculiarity of this variety is, it is mature and good for use at every stage of its growth. Another peculiarity is its adaptation to a great variety of soils—even loamy clays, quite heavy with clay, if lying elevated. Almost any soil that will produce corn well will produce this—except low, alluvial grounds, where there is too much vegetable mold, that causes excessive running to vines.

871. **Making Seed Bed and Growing Plants.**—Mr. Murray says: "We have never used glass for these plants, preferring to give them as much air as possible, making them the more hardy. Put the seed in the bed about the middle of April; transplant after they have been above ground two or three weeks, or any time before they commence running. Place the potatoes in the bed so that they will scarcely touch each other—a bushel on from twenty-five to thirty square feet, from the 1st to the 25th of April. Plants can be packed so as to keep perfectly good for fifteen to twenty days while transported from the seed beds to other parts of the country.

"The best method of sprouting sweet potatoes is in the ordinary manner of a manure hot-bed. This bed is made by building up the sides with plank and filling in to the depth of fourteen inches with fresh hard stable manure. The manure should be packed as hard as possible, then cover over to the depth of two inches with light soil, then, after laying on the potatoes, cover them to the depth of four inches, with light sandy soil or loam. By covering the potatoes deep, the stems are longer and much more hardy and thrifty.

"Cover the bed with coarse hay, two or three feet deep, to prevent the heat from escaping, and the rain from wetting it. Take off the hay in the heat of the day, from nine to three o'clock, if it is warm weather. When the bed begins to heat it must be examined by running the hand into it—a moderate warmth is all that is necessary—more than that will be injurious, and must be counteracted by leaving off the cover at night, or by applying cold water. When the plants appear, and afterward, they must be watered daily, unless the bed should be too cold to allow it. Warm water from a pond or ditch is best.

"As often as one growth of plants is pulled, another takes its place. Care must be taken, when pulling the plants, to hold the potato firmly in the bed by pressing on it with the left hand."

872. **Setting the Plants.**—Put the plants in the ground from the middle of May to the middle of June. In some seasons you may commence earlier than this; in some you may continue later. Generally, the best time is from the 10th or 15th of May to about the same time in June.

In setting the plants, care should be taken to have them set well in the ridge, fully as deep as they originally stood in the hot-bed, and the soil should be well compressed about the roots. Sprouts should be set from twelve to fifteen inches apart in the ridge, and when in hills two or three to the hill.

In setting out plants, a boy drops one on each hill, taking two rows at once; a man follows, and taking the plant in his left hand, runs three fingers of his right hand through the top of the hill into the manure; as he withdraws them he quickly thrusts in the root of the plant to the bottom of the hole, and then, with the thumb and finger of each hand, firmly presses the earth around the plant. Plants are best set out when the ground is not too wet and cold—much better before a rain than after. Some use a common mason's trowel in setting, thrusting in the trowel somewhat obliquely, and as the trowel rises, the plant in the other hand takes its place.

Light sandy soil, free from undecomposed vegetable matter, is generally selected for the crop. Plow as for oats, harrow thoroughly, mark it out thirty-three inches each way for the hills.

Use animal, rather than vegetable manure—that is, manure from the stable, rather than the straw stack.

The manure for sweet potatoes must be well rotted by composing it, or otherwise. Marl mixed with it is an advantage. From eight to thirteen two-horse loads, according to quality and abundance, are used per acre, a one-horse cart-load will make from two hundred and fifty to four hundred hills, which should be made, or the manure covered as soon as it is put in. From four to six good hoefuls of earth are sufficient to make a hill.

873. **Plowing and Tillage for Sweet Potatoes.**—Plow when the land is in good condition, no matter if a week or two before time for planting. At planting time pulverize well, if necessary with harrowing and rolling (or, what is better, drag-crushing), and throw the surface into high ridges by turning together two furrows with a two-horse plow, making the ridges about three and a half feet apart from center to center. It is not necessary for the ridges to be wide, but they must be of good hight, as the potatoes will only grow in length as they are accommodated with loose earth; so if the ridges are flat, the potatoes will grow short in clumps. Those wishing to raise but a small quantity will probably find it more convenient to make their ground into hills with the hoe, about five feet apart.

Commence tilling with an adjustable cultivator, that can be adapted to the breadth between the ridges, and throw back the earth with a wide shovel-plow, re-forming the ridges, finishing with the hoe. In using the hoe, particularly after the vines commence running, be careful not to strike into the ground deeply near the stem, lest you cut off the best of the projecting tubers.

Mr. Murray says: "All land is the better for subsoiling. We subsoiled twenty-five acres for this crop last year, and are sure it paid. New grounds produce this crop well, where there is not too much vegetable deposit—not turf. Turf should be subsoiled first with another crop—corn or wheat is favorable. The cultivation necessary is to keep the ground clear of weeds, and should the soil become hard, to loosen the tops of the hills or ridges with hoe or rake."

In New Jersey, the crop is tended with small cultivators and hand-hoes. One hand is allowed to attend 40,000 plants, or about eight acres.

Perhaps no other plant cultivated for producing food possesses such tenacity of life—such a fund of vitality to resist and overcome unfavorable circumstances in transplanting as the sweet pototo. The plants can be sent in good growing condition a long distance.

874. **Harvesting and Storing.**—In harvesting, some use the plow—first cutting the vines near the stem. After the plowing, four-fingered hooks are used for hauling out. When the ground is light, it is about as well without plowing to throw out with flat-fingered spading-forks, or even common manure-forks. On a small scale, get them out anyhow, as you do beets or carrots.

In Delaware and Virginia the crop is generally dug with large hoes made expressly for that use. When stored for spring, they are carefully placed in baskets, in the field, and then emptied into boxes or barrels, and sometimes covered with dry sand, or leaves, or cut straw, but often without anything to keep the air from them but the lid of the box, which, if tight, is mostly sufficient; but they must be kept in a dry, warm room. If the crop brings $50 per acre it is sufficient to pay expenses. All over that is profit; and two hundred and fifty bushels per acre is a large yield.

At the North they are kept through the winter in cellars, prepared expressly for the purpose and kept warm. On a small scale, with experience and plenty of manure, the crop should be, in a good season, from 150 to 200 bushels an acre, as far North as it will grow.

Sweet potatoes should always be dug before the heavy frosts in autumn, as a frost which would be severe enough to kill the vines would injure the potatoes very much for table use.

In South Carolina we have seen them kept in a very rude way; simply by laying down cornstalks on the ground, and then covering with stalks, and perhaps a little earth. Frequently large piles are made, and over them rails set up in form of a roof and covered with straw. Sometimes pits are dug and a tight roof made, and the potatoes stored in pine straw. The greatest difficulty in growing sweet potatoes at the North is in keeping them over winter. They will only keep in an atmosphere that is of even and mild temperature, and entirely dry.

875. **The Jerusalem Artichoke.**—The culture of the Jerusalem artichoke (*Helianthus tuberosus*) was introduced into England in 1617, but it is seldom cultivated, except in gardens. It will grow in any soil that is not too wet and cold, yielding a large amount of nutritive matter with little labor. It can not be grown in any series of rotation; for if the ground is once stocked with roots, it is almost impossible to clear them out, and they will come up like weeds, even if the land is seeded down to meadow or pasture. In Ohio, many good farmers bear evidence to its value for feeding stock. The usual method of cultivation is to plant the tubers in rows, three and a half or four feet apart, and eighteen inches to two feet in the row, and cultivate between the rows, as you do corn. The tops soon cover the ground and kill out the weeds, and no further culture is given. In the fall, after the tops have died, the roots are either dug up or the hogs are turned into the field. Commonly a portion are taken up, and the hogs are allowed to follow and dig up the

remainder. Enough are always left to seed the field for the next season. In this way the same piece of land will bear a succession of crops of this plant without further seeding. The hogs dig or plow the soil very deeply in autumn, which destroys any grubs that may be injurious, and fits the land for the next crop.

Cattle, as well as hogs, relish the roots. In France they are usually fed to sheep, with excellent results. In the *Journal d'Agriculture Pratique* for April, 1858, M. Doniol gives the results of his cultivation of this plant on inferior soil for fifteen years. He fed off the stems and leaves with sheep in October and November, and then dug the tubers, feeding the sheep with them, either on the ground or in the pens. He bought the sheep in October, and calculated the value of the crop from the increase in money value of the stock. Half a hectare (one and a quarter acres) was sufficient to keep eighty sheep from that time until the following April, and the increase in value of the sheep was eight francs per head, or 640 francs ($111 04), the value of the acre and a quarter of artichokes on poor land. From this must be deducted, however, the cost of culture of the crop and care of the sheep, but both are necessary under all circumstances. It seems that the sheep obtained no other kind of food; and it is good evidence of the nutritive qualities of this root that they were able to increase in value upon it. Had M. Doniol given the weight of the sheep when newly bought, and the time of sale in April, his article would have been of more value.

This plant has about the same amount of water in its organic composition as the potato (76.3); but instead of the large amount of starch which is in the latter, there is almost an equal quantity of sugar (14.80) in this, and the nitrogen compounds are nearly the same in quantity (2.38); but these amounts vary in tubers raised on different soils and the amount of cultivation they have received. Enough, however, is known to show that these roots are worthy of attention, not for feeding exclusively to stock, but along with dry feed during the winter. Thus used, they will prove highly advantageous. They should be grown on land which they can occupy for a succession of years, that from some cause is not well adapted to the culture of the more regular crops. If occasionally dressed with a good coating of manure, they will soon repay the expense. Ten, and even fourteen, tuns (tops and roots, we suppose) per acre have been obtained in France, but in this country a much larger yield has often been secured, so that a greater number of sheep could be fed on an acre in Ohio than in France, and the profit would consequently be much greater. This root should take a position among the crops raised in this country for green feed in winter and early spring, when stock need it most to keep them in good health.

In Mississippi we found this root upon many tables of good planters' houses, dressed in the same way that mashed turnips are, and it is by no means a despisable dish. After a little use it is generally well relished.

876. **Turnips—Importance of the Crop—Cultivation and Use [see No. 521].**—It sounds strangely to an English farmer to hear Americans underrate the

importance of the turnip crop—a crop that he looks upon as the main stay of agriculture as much as Indian corn is here. Turnips are not so important here as there, but would be considered much more so than they are now if more grown. Some of the Orange County milk dairymen have raised turnips to a limited extent; but many think they can not raise them at such cost as will warrant feeding them in preference to grain or other dry feed. And some are of opinion that turnips cause a large flow of milk, but it is thin and watery, and will generally have a peculiar taste that renders it less salable. This may be in some measure true, but if milch cows can not be fed upon them, other stock can, and cheaper than upon almost any other food of equal value.

In the year 1860 we grew a fine crop of red-strap turnips, sown broadcast, after other crops, and wintered two cows almost exclusively upon them, feeding hay but lightly, and but little meal. The bulky food was cut cornstalks. These cows gave a good mess of milk, and after the first two weeks the turnips did not injure the flavor materially. In the spring one of these cows was dried off and fed meal two or three weeks, and sold to the butcher, and was really good beef. This proved that turnips have some fattening qualities.

The best use, however, for turnips is to feed sheep. In England they are fed on the field by hurdling sheep, on small portions at a time, and as long ago as when Stephens wrote his "Book of the Farm," were considered worth $25 an acre for this purpose. The sheep eat off the tops and crown of the root, and then a man goes over with a turnip picker and pulls out the bottoms so they can eat the whole without waste, and at the same time enrich the soil. Turnips are most commonly sown in drills in England, and in this country broadcast. There, the bulk of the crop is fed as indicated above, and the feeding continues all winter; but in all the Northern States the winters are too cold for this; and where they are sufficiently mild, the summers are so hot that turnips are not a good crop. They are so in all the States north of Virginia, notwithstanding the trouble of storing them for winter.

The best manure for turnips is bone-dust, or superphosphate of lime, or guano. With manure on well-prepared land, from three hundred to one thousand bushels per acre is a common crop. The best soil is on newly-cleared forest or reversed sod, not too clayey; but they will grow well on pretty stiff clay if finely pulverized.

Turnips of great size are sometimes grown, weighing eight or ten pounds, and measuring two and a half or three feet around; but those of smaller size are esteemed the best—say one to four pounds.

In sowing turnips, great care should be used not to get the seed too thick. This is the greatest fault of ninety-nine out of every hundred persons employed to sow turnip seed. The common rule is a pound to the acre. That rule comes from England, where the seed is drilled, and if all of it grows, about nine tenths of the plants are thinned out.

The time for sowing in all the Northern States is pretty well indicated by the old distich:

> "On the twenty-fifth of July
> Sow your turnips, wet or dry."

Turnips sown broadcast too thick to grow may be thinned with the harrow, after they are up enough to show, without injury to those that remain untouched by the harrow teeth. Indeed, it is a pretty good way to put them in rows as though planted with a drill. It also kills a great many weeds, and loosens the crust that forms over some land, so that the plants left take a rapid start and grow much better than they otherwise would. It is not a bad plan to treat corn in the same way; and we certainly have seen winter wheat highly benefited by a thorough harrowing in the spring.

The greatest trouble that farmers experience in turnip-growing in this country is from a small insect called the turnip-fly. We believe the best remedy is to prepare the ground in the best possible manner, and use something that will give the plants an early, rapid start. Poudrette is good for this purpose. So is guano, by which we mean pure No. 1 Peruvian guano. We have found a liberal use of salt highly beneficial; say five bushels per acre. We think it one of the best remedies for preventing the ravages of the turnip-fly; and we have never seen a sign of the disease known as "fingers and toes," where we have used salt liberally; and we are satisfied that the bulbs grow not only heavier and healthier, but that they are more nutritious.

The disease known as "fingers and toes" probably affects ruta bagas more than round turnips, though it sometimes spoils the latter. This disease is said to have originated in Scotland forty years ago. The bulbs become deformed and grow into excrescences, rendering the crop worthless. Sometimes they run to fibrous roots, and sometimes they are filled with insects. Sometimes the excrescences resemble warts all over the bulb, drying the center to a brown, spongy mass. The solid matter of a healthy white turnip is seventeen per cent. One of these forms of disease of the turnips resembles the potato rot, and has done great damage.

877. **Storing Turnips for Winter Feeding.**—Where a farmer has no barn cellar, it is no trifling job to store a large crop of turnips, and that is one of the causes that prevents their cultivation to the same extent as in England. They can not be left out to be eaten where they grow in the grazing and stock-feeding States, nor kept for winter feed, unless safely stored in cellars or pits. The easiest way to save them is to lay them on dry ground, slightly inclining south if possible, in piles like hay windrows, about three feet through, and cover with straw, sedge, or cornstalks six inches thick, and earth eight inches, with straw ventilators every ten feet. Another good plan is to put them in round piles, each of thirty bushels; but it makes more labor, yet has the advantage that a pile can be opened and taken in before freezing in a cold day, and without exposing the remainder, as in the long piles.

All turnips stored for winter use should be trimmed of tops and tails. A knife that will weigh half a pound, and is eight inches long in the blade, is the tool to trim with. Held all the time in the right hand, the operator seizes a turnip with the left by the top, and cuts off the tap-root with one blow, and at the same time tosses the turnip and catches it with the top toward the knife, with which he cuts off the top by another blow, and at the same time tosses the turnip into the cart, basket, or pile. One smart workman at topping will do more than three poking ones who always pick up a turnip wrong end foremost. If you do not care to cut the tops very close, or if you can stand so as to let the turnip fall in the right place, you need not let go the first hold, but cut both tail and top, throwing the latter in a pile instead of throwing the bulb.

Never pull turnips nor handle them in wet weather.

878. **Ruta Baga Turnips.**—All that we have said about the value of turnips, and preparation of ground, manure, cultivation, pulling, and storing, will apply to ruta bagas, except these should always be grown in drills, and hand-weeded and thinned. They must also be sown earlier—never later—than July 1, and generally not later than June 15.

It is a good way to prepare the land for ruta bagas, after it has been plowed and cross-plowed, and mellowed, and rolled, to take a small plow and throw up ridges, say two feet six inches apart, rake the tops smooth, and plant the seed with a drill harrow. As soon as the weeds get to be half an inch high, run a one-horse subsoil plow midway between the rows, to loosen up the soil thoroughly, and then with Knox's root-cleaner or horse-hoe, extirpate the weeds. The only hand-hoeing necessary will be in the row to thin out plants. When the crop is ready to be dug, run a large subsoil plow close alongside the row, and the roots will be so loose that they can be pulled up with the greatest ease and thrown into heaps, whence they are carted directly to the pit made for them on the dryest part of the field, and there topped and buried.

These turnips will grow upon a greater variety of soils than the round turnip, but the one best suited for a good crop is a rich, alluvial, sandy loam.

It is advisable to set the gauge of the drill so as to scatter the seed very thick in the row, and thin them out to stand ten or twelve inches apart, using the plants where too thick by transplanting them to fill up vacancies. In a small way, these turnips may be sown in a seed-bed and all transplanted like cabbages.

The vitality of ruta baga seed endures for several years, but it is not safe to use old seed of white turnips.

The soil and kind of fertilizer used have a great deal of influence upon the quality of turnips. Some are worth double the value of others, either for the table or cattle-feed. As a general rule, all applications of bone manure will be paid for in quality if not quantity. About 15 bushels of bones, or 600 lbs. of superphosphate, or 200 lbs of guano per acre, is a fair dressing.

In England, turnip-growers manure high—15 or 20 full horse cart-loads of strong stable dung, well rotted, to an imperial acre for ruta bagas, and about two thirds the quantity for white turnips.

We have had turnip seed lie three weeks after sowing in a drouth, without vegetating. At such a time, if there had been moisture in the earth enough to cause the seeds to sprout, it would have been fatal to them, and we should have prepared the ground anew and sowed more seed. In all English publications the term "Swedes," or "Swedish turnip," is made use of, and it is sometimes confounded with the ruta baga, because it is spoken of as a long root; but it does not appear to be identical with the variety grown in this country under the name of ruta baga.

The Swedes, White Globe, Yellow Globe, White Stone, Red or Purple Top, are all good varieties of field turnips, and can be grown with less labor than ruta bagas. A bushel of turnips weighs about 42 to 45 lbs., and it is stated that English sheep-feeders allow 18 to 23 lbs. a day to a young sheep, and 24 to 37 lbs. a day to a full-grown sheep; and that a fatting ox will eat a tun a week.

879. **Carrots as a Field Crop.**—We have already spoken of carrots in the garden (527), where they should always be grown, for they really are a most valuable article of food. Perhaps the reason why they are not more esteemed as esculents is because the kind grown in the garden is that which should only be grown in the field as food for domestic animals. Perhaps the best for table use is the "short-horn" carrot, but we esteem the long orange carrot the best for field culture, unless the crop is intended for some city market, and then we would grow the short-horn variety. There is no doubt of the fact that this carrot can be profitably grown as a field crop for marketing, near cities and large towns. Whether it will pay to raise carrots for feeding stock, is a question often asked. "It don't pay," is an assertion often made. That it does we assert, without fear of contradiction, in all places where corn costs fifty cents a bushel to produce it, as it does upon many farms in the Eastern States. In Illinois, where corn is so very easily produced, and bears so low a price, it may be true that carrot growing is not profitable. Still, cheap as grain may be, as feed for stock, it will sometimes pay to feed carrots on account of the improvement in health to the animals consuming them.

We consider carrots a very sure crop on suitable soil, properly prepared; and for stock, when taken in connection with other feed, they are invaluable. They are not only healthy, but will fatten cattle, sheep, and horses.

One farmer who has grown carrots for stock feeding for twelve years, says: "I have fatted and sold four head of cattle this winter on carrots, with one quart of meal sprinkled on them at a feed, together with cornstalks. One was a Durham cow, which was milked all the while until sold for beef, and was fat. This was an experiment, and proved satisfactory—that cows can be fatted on carrots and meal, and milked at the same time; at no time was the meal over two quarts per day. I also have six other cows, all of which give milk of the richest kind, and a good flow of it, that are fed on carrots once a day, and once on poor cornstalks and clover hay."

From 700 to 800 bushels per acre is an ordinary crop, with good land and good culture, and 1,200 bushels may be raised by high cultivation. Allowing 250 pounds of carrots, which is conceded by practical farmers to be equal to 100 pounds of hay, and at 50 pounds to the bushel, we have at the highest above rate of yield the equivalent of 12 tuns of hay per acre, which will take seven acres of good meadow to equal.

880. **Suitable Soil, and its Preparation for Carrots.**—The most suitable soil for carrots is a light, rich, sandy loam. Manure, if used, should be well rotted; otherwise the roots grow forked. What we call cheese manure is best—that is, manure that cuts in the heap like a soft cheese. Take a rich piece of sward, where the soil is deep, the longer seeded the better. Cover with manure; plow with a double plow; roll and drag fine the last of March or the first of April. Let it lie till the first week in May; then gang-plow and drag fine again, to kill weeds, and sow immediately two pounds of seed per acre. If you have not a suitable piece of sward, the next best is land that was cultivated the previous year in potatoes. Whatever the land used may be, give it at least two plowings, cross and lengthwise, and three harrowings. It must be made loose—no lumps or stones. If you have got a roller, apply it after each harrowing. Some lands may require plowing half a dozen times, and will pay for all the labor. New ground will give you the best quality of carrots—old ground the largest roots.

The prevailing system of carrot culture, to make drills by throwing two light furrows together, leveling them and sowing on top, is very erroneous, By this the roots and fibers run to the sides and are killed by the hot sun. In England, Ireland, and Scotland this plan is preferable, in consequence of their climate being moist and the soil being very heavy. This borrowed system should be discarded by all who wish to get good crops of carrots, turnips, and mangel-wurzel.

881. **Sowing Carrot Seed.**—One who grows carrots as a market crop, entirely by hand labor, gives the following directions: "I have a marker or large rake made of three-inch scantling—a handle in the center, with a brace on each side to guide and strengthen it. In this six wooden teeth one inch in diameter, six inches long, are set at twelve inches apart. One man works this, opening five drills at each through, as one tooth must be kept in the last-made drill to keep your rows straight. When marked, one man will sow an acre a day, at least, of those drills. I then sow radish seed in the same drills for market. They do not interfere in any way with the carrots. I have this season sold radishes enough from the carrots, at one dollar per hundred bunches, to pay for the whole working."

Another experienced carrot-grower says: "I always sow by hand, as I find it cheaper and better than by any machine I have yet seen, and any one can do it. If I sow at thirty inches apart, I take a piece of wood four inches wide and two inches thick, drive a staple in the end so as to hold the point of the plowshare, and then mark with small plow and one horse. As they are marked I sow the seed, which should be rubbed in sand before sowing. I should advise the soaking of seed, but to inexperienced hands one hundred chances to one but they would let it rot. By sowing your seed dry, you run no risk. When sown, take some twiggy branches and tie them together, just large enough for one man to pull easily, and run this lengthwise and crosswise of your carrot rows. This is sufficient for covering the seed."

Another thinks it is of great advantage to germinate the seed before sowing, by mixing it with fine sand. The mixture is laid in a heap, and occasionally watered for two or three weeks, and then sown in drills. By this plan the seed may be sown later and the plants come up quickly, and are enabled, in a measure, to get the start of the weeds.

882. **Cultivation of the Carrot Crop.**—The first thing to be considered is whether you intend to work them with manual or horse labor. Close to a city, or where help can be had when wanted, manual labor, when judiciously managed, or when you have only a small farm and wish to make every acre produce double, will not be found unprofitable, although it is a crop that requires a good deal of attention, and the amount of hand labor required, where that is wholly depended upon, we believe deters many people from engaging in the business of growing carrots. We wish to impress upon all such that hand labor, except to a limited extent, is not indispensable. Nearly all can be done by horse-power, or better by a trained mule. In the first place, plow deep ; subsoil deeper, if to be planted by hand ; marking with a subsoil plow instead of a toothed marker will be found profitable.

Sowing radishes with carrots enables you to see the rows sooner ; then if to be horse-hoed, commence at once, so that the weeds shall not get the start. It is easier to kill ten little weeds than one big one. If the crop is to be hand-hoed, then as soon as the plants are up sufficiently to trace the rows, grind up your hoes sharp, and commence by hoeing between the rows as close as possible to the plants, and be sure to cut across the rows and leave the plants the width of your hoe apart, and if you are a good farmer there will not be many weeds left, because you will not try to raise carrots on a piece of land full of seeds of weeds and foul stuff. After about two weeks hoe in like manner, and what weeds are left pull with your fingers, and leave the carrots about seven or eight inches apart. You will not find it half as troublesome a crop to grow as most farmers imagine. One carrot-grower says the great and principal objection to carrot-growing is the thinning of them. Hand-thinning is not indispensable. Of course the carrots are not so large ; for feeding, small ones are as good ; for selling by measure, larger ones are better, as they fill up and leave very leaky crevices. At present they are frequently bought by weight, as all roots and fruit should be bought.

883. **Harvesting, Storing, and Value of Carrot Crops.**—A great deal of

the work of harvesting may be done by a horse and plow, either by turning a furrow away from each side, or by running a subsoil lifter along the rows to loosen the ground and make the digging and pulling easier. Then a man with a fork works out a row very fast. Where it is not an object to crowd the crop upon a small space, we recommend the drills thirty inches apart, and this gives good room to plow them out. In commencing, take out one row in the middle of the plat with the spade, and then plow down one row and up the other, and have hands to follow and pull and throw in a row in the center.

In storing carrots outdoors, put them on the surface, in a dry place, in long piles. Lay them four feet wide at bottom and four feet high, tapering to the top to one foot wide, keeping the crown or top at the outside, covering all with one foot thick of straw, and on this eighteen inches of earth. The covering of course depends on the climate where raised. Leave a chimney every twelve feet apart to allow the heat to evaporate. This is done by placing a sheaf of straw on top and filling the earth to it. In storing, a few bushels of the best should be selected for seed, and put out in March or April in drills three feet apart, and one foot from plant to plant, the crowns one inch above the surface. As to the yield per acre, this altogether depends on your land, manure, working, and the season.

One farmer says: "I know that carrots can be raised for five cents per bushel, and think they can be raised for less. Let's figure a little:

Use of one acre	$7 00	Gauging rows	$1 00
Manure	10 00	Seed and sowing	3 00
Plow, roll, and drag	2 00	Hoeing and harvesting	20 00
Whole expense			$43 00

And this is liberal for one acre. Estimating the crop at one thousand bushels, this would give us a cost of $4\frac{3}{10}$ cents per bushel on the average, and the value of the crop, at $12\frac{1}{2}$ cents per bushel, which is low, will be $125, a profit of $82."

884. **Carrots and Rye on the same Ground.**—We have never seen this practiced, but having seen it suggested, think well of it, and call attention to the plan. The ground is well prepared in autumn, as though for carrots, and is then sowed with rye. In the spring the carrot seed is sown with a drill, or a marker is used, and the seed put in by hand. Of course nothing is done till the rye is harvested, when a cultivator or horse-hoe is run through, or the stubble turned by two light furrows, turned from the row, and the plants thinned by hand-hoe. As soon as they get a good start, the furrows are turned back; afterwards the horse-hoe may be needed to run through once or twice. It is necessary to put in the seed earlier than for the ordinary field crop, which is usually after corn planting. If we were about to adopt this plan of growing rye and carrots, we would drill the rye, leaving out a drill every two and a half feet for the carrot rows; and the rye we would mow for feed instead of saving it for the grain. If corn were planted in May, and rye sown in October, and carrots in April, three full

crops could be harvested in two years and the ground prepared for another. Of course this kind of pushing would require high manuring and good cultivation.

Let it always be remembered that all root crops require deep plowing, heavy manuring, a thorough pulverization of the soil, and good after-culture to keep down the weeds, and they then leave the land in fine order for spring grain, to be seeded down with grass or clover.

Root crops prepare the ground for all other crops. Barley succeeds better after roots than after any other cultivated crop; and it is noticed that grass always takes well after turnips.

885. **Parsneps as a Field Crop.**—All that we have said of carrots, except storing for winter, will apply to parsneps. Instead of digging and storing, let them stand where they grow till spring, and then dig and feed them from day to day, and they will make butter, beef, or mutton faster, in proportion to cost, than any other feed. If the roots are small in autumn, and a snow falls before the ground freezes, they will continue to grow, and will sometimes double in size. They must be dug before commencing a spring growth. There is no more productive root crop than parsneps, and we do not think there is any of more value during the month in which they can be raised daily from the ground in spring, and fed to any kind of stock. They are very valuable if cooked, for pigs.

886. **Onions as a Field Crop.**—We have already spoken of onions in the garden (532), but they are grown to such a large extent as a field crop, that we may give some of the best information upon the subject that we can select; and first, of the soil and preparation.

The following statement is made by a large onion-grower, J. W. Proctor, of South Danvers, Massachusetts. He says: "Any soil, of substance equal to 40 or 50 bushels of Indian corn to the acre, will grow onions—the better the soil the better the crop. Plow to the full depth of the soil, and liberally manure. Plant with corn and carrots, until completely pulverized. Plow early in the spring, and thoroughly intermingle the manure with the soil. Let all obstructions to the free distribution of the seed be removed, and the ground thoroughly prepared for the reception of the seed, which is distributed by machines in rows fourteen inches apart, as true as a line can be drawn. This is essential, because of the facility afforded for the use of the onion-weeder. After the land has been once thoroughly plowed and cultivated, shallow plowing is usually practiced—say not deeper than can be conveniently done with one horse—from four to six inches. The next material point is to get the land ready early. No good cultivator permits weeds to grow among his onions, and consequently is specially careful that the seeds of weeds shall not be scattered upon the land, either in the manure or otherwise. A bunch of purslane may destroy a peck of onions.

"You must keep your onion field entirely free of weeds, and then you may expect 500 bushels an acre, raised at less cost and greater profit than potatoes.

"The best soil is a sandy loam of a somewhat dark color. Onions will not do well upon clay, particularly if it is a white clay. The surface must be absolutely free from lumps, stones, and sods. A good crop, however, may be grown upon an inverted sod, even the tough one of the Western prairie. All varieties of onions are grown more or less, but chiefly the Silver-skin, which give the most profitable results in this section.

"Never plant old seed, and the nearer the surface you can place your seed, if barely covered, the more perfectly it will vegetate, and the better the bulbs will be, as they naturally grow on the surface, not under it.

"Good cultivators grow their own seed; and they select, for this purpose, onions of the form they wish to grow, and set them where no bad seed can intermingle, as much depends upon procuring and preserving the seed pure. As well may you hope to grow figs from thistles as good onions from poor seed."

887. **The Fertilizers best fitted to Promote the Growth of the Onion.**—Good stable manure, old and well fined, is always a healthy dressing. Let it be applied generously—six, eight, or ten cords to the acre. "Muscle-bed" is a good application for onions. Guano does very well; but there is nothing quite equal to barn manure, thoroughly rotted and fined, spread upon the surface, so as to give a quick start to the crop. Success depends very much upon an early start, as early onions are much better protected from every class of blights, and especially from that chief of devourers, the maggots. Ashes, leached or not leached, are a good application, and are very much used by onion-growers.

The first difficulty in the way of raising onions is the worms. The next trouble is the weeds, and on this account swamp muck is admirable manure; it will contain no seed.

888. **Remedy for Onion Worms.**—Benjamin Clifford, of Norwich, Vt., has discovered that tar is an effectual preventive against the fly that produces the onion maggot. An equal quantity of hot water and tar was stirred together, and after standing a few hours, the fluid part was sprinkled upon the onions on one of the beds. This application was made in June, when the young plants were first attacked by the fly, and the process repeated about two weeks afterward. The result was a fine crop upon that bed, while upon the other not a single onion was raised.

Dr. O. W. Drew, of Waterbury, Vt., writes us that the onion crops of that town had failed to such an extent for years that the people had to get a supply from Boston for their own use, instead of growing them for sale, as they did before the worms became troublesome. He says: "When the plants get three or four inches high they begin to turn yellow and die, and the bulbs become rotten and full of maggots. Many experiments have been tried with lime, salt, ashes, and plaster, without benefit. Last spring (1861) I sowed a bed with red onion seed, and when the plants were about four inches high, I found that they were affected as usual, and I poured a full stream of boiling water from a large tea-kettle spout directly upon each row, and repeated the application, and the plants, instead of being killed, were refreshed, and looked as bright as though they had had a May shower, and no more died, though the worms did, and I grew as fine a crop of onions as I ever had in the most successful years. The remedy is apt to deter timid people from applying it, but I assure them there is no danger, and it is effectual."

If this should prove to be a remedy in other cases, it will be almost invaluable to those who cultivate onions as a crop; many who have depended upon them as no inconsiderable item of annual income, have been obliged to abandon their cultivation.

It appears that the fly which produces the maggot which has so seriously damaged the onion-growers, belongs to the same tribe of insects that deposit eggs in manure, and it is therefore recommended to use no putrescent fertilizers for onions; nothing of animal production, unless it may be guano or bone-dust.

889. **Profit of Onion Culture.**—The production of a good crop of onions is estimated at five hundred bushels per acre, and the cost in Massachusetts is stated about as follows: Cost of preparing one acre of land and planting the seed, $10; six pounds of seed, $3; manure, $30; cultivation and harvesting, $40. Total, $83. The harvesting is done by raking the onions into rows with an iron tooth-rake about the first or perhaps middle of October. The planting should be done a week or ten days before corn. At one dollar a bushel, it will be seen that a good yield gives a handsome profit to the cultivator, and where the insect is not troublesome, the crop is about as sure as a crop of Indian corn, and it may be cultivated upon the same spot for an indefinite period.

890. **California Wild Onions.**—It has been stated in California papers that onions growing wild have been discovered in that State, an inch and a half in diameter, covered with a thick husk like the soap-root. They are palatable and even preferable to garden onions, and it is thought may prove a valuable addition to the cultivated varieties. We give the statement as a hint to onion-growers to try this variety in a cultivated condition.

891. **The Quantity of Roots an Acre will Produce.**—Some persons wish to know how much feed can be obtained from an acre of any kind of roots. This they can determine by weighing a few of an average size and then calculating the number per acre. In this calculation the following table will be useful. It shows the number, weight, and measure of the growth of an acre planted at various distances apart:

Dist. between the rows.	Dist. of plants in row.	No per acre.	Weight of each root.	Bushels per acre.
2 feet	1 foot	21,780	12 lbs.	4,356
do.	do.	do.	10	3,630
do.	do.	do.	5	1,815
do.	do.	do.	2	726
do.	2 feet	10,890	12	2,078
do.	do.	do.	10	1,815
do.	do.	do.	5	707
do.	do.	do.	2	363

Dist. between the rows.	Dist. of plants in row.	No. per acre.	Weight of each root.	Bushels per acre.
3 feet	1 foot	14,520	12	2,940
do.	do.	do.	10	2,420
do.	do.	do.	5	1,210
do.	do.	do.	2	484
do.	2 feet	7,260	12	1,452
do.	do.	do.	10	1,210
do.	do.	do.	5	605
do.	3 feet	4,840	12	968
do.	do.	do.	10	806
do.	do.	do.	5	403

This calculation of measure is based upon sixty pounds per bushel. The table shows that it is not necessary to have roots very close together in order to raise large crops. For instance ; if the rows are three feet apart, and the plants two feet apart in the row, with no vacancies, and the roots average ten or twelve pounds, the crop will be large. It also shows the importance of having the ground all occupied, as the yield will be seriously diminished when this is not the case.

SECTION XLIX.—SORGHUM SACCHARATUM—CHINESE SUGAR-CANE—AND SORGO SUGAR-MAKING.

WITHIN a few years, the seeds of the plant generally known as Chinese sugar-cane, and that of Imphee, or African sugar-cane, have been disseminated over the United States, and cultivated with various degrees of success. To sum up reports, in short, we should say that in all good Indian corn soil, where that crop can be grown to average forty bushels an acre, a crop of sorgo can be grown with profit, if the grower is provided with conveniences for converting the juice into sirup, the quality of which is excellent.

W. Mathar, of Cuyahoga County, Ohio, says: "I will give the figures, and state, from experiment, that sugar-cane is profitable to raise for family use: $58\frac{1}{4}$ rods of ground, planted May 27, 1858, harvested October 27, producing 425 gallons, yielding $91\frac{1}{2}$ gallons of molasses, worth 63 cents per gallon."

The Davenport (Iowa) *Times* states that one farmer has made sirup at a cost of sixteen cents a gallon. In many places in States where apples abound, the old-fashioned cider-mills have been used to grind cane with success.

Such facts as seem important to be known to farmers about this plant, we shall give in this section, followed by others about maple-sugar.

892. **Soil and Situation for Sorgo.**—E. F. Newberry, of Montgomery County, Ill., in the *Prairie Farmer* of April 18, 1861, gives a number of facts in regard to this matter, applicable to its culture in Illinois, from which we extract the following: "The important point of selection of soil has been almost wholly overlooked. It has generally been supposed that the larger the stalk the greater the yield of saccharine matter, and of course the richest, deepest mold has been selected for its growth. This is a great mistake. I will illustrate by a little experiment of my own. Part of my cane grew on a southern slope of very moderate richness, and part on a bottom the very reverse in fertility. The stalks in the latter position were of much larger growth than those in the former, yet the first produced more sirup per acre and of a superior quality. Besides, I found no difficulty in procuring its granulation, while the latter would not crystallize. The soil of the slope was a reddish brown, slightly intermixed with sand. The cane brought to my mill by my neighbors from the borders of the prairie and from timber land invariably excelled in quality that grown in the deep, rich soil of the center of the prairie.

893. "**Preparation for Planting.**—The ground should be put in perfect tilth to receive the seed, as the plant when young is quite feeble. As regards manure, the present richness of the soil should be the guide taken in connection with the facts stated above concerning the overgrowth of stalk.

894. "**Time of Planting.**—Experience has proved that the seed can safely be sown a week or ten days earlier than corn; and as the manufacturing season is short, every day we can add to it is precious. A piece planted the 25th of March made the best cane in the prairie. A mild frost inflicts no injury. Cane planted the 16th of April was ready to grind the 21st of August, in Montgomery County, near the center of the State. Seed should be sprouted before sowing, and a week can be thus gained. As there is a period, embracing from four to six days, in which the cane is in a greater degree of perfection for manufacturing, I would strongly urge sowing in such succession as will insure its being worked up during that period. The cultivator will of course take into consideration his facilities for working up, in regulating their succession. I regard this as one of the most important points in the whole business. The sirup made at such period will, if properly managed, be of a beautiful transparent color, entirely free from any foreign taste or smell. Besides, this is the only time that crystals can be produced with any certainty. I have no doubt that the occasionally successful attempts at granulation which have occurred from year to year have resulted from accidental manufacture within this period. When the first frost comes, all the cane which remains should be cut and carefully protected from the weather by being placed under a shed or covered over with straw so that neither the sun nor wind can act upon it.

By covering so as to prevent freezing, good second-rate sirup, but not sugar, can be made until the first of December, and thus lengthen the manufacturing season a whole month. It will not do to carelessly throw the stalks in a pile in the open air, expecting them to keep good for a month.

895. "**Manner of Planting.**—Enough seed should be sown in drills three feet apart to insure one plant every twelve inches. Thinner than this I regard not only as a waste of land, but as rendering the stalks liable to too great a growth, which is an injury. Shallow sowing (from 1 to 1½ inches) insures speedy germination most certainly. Cultivate carefully with the hoe and cultivator.

896. "**Stripping and Topping.**—The cane should be stripped at least one week before using. This course certainly does enrich the cane, and also renders it easy to save the blades for fodder, which should be bound and shocked between the rows. The stripping can be performed either with the two hands encased in buckskin gloves or by means of a wooden knife about five feet long. Our experience led us to prefer the hands, as we could strip a stalk, and sometimes two or three, at a single stroke and retain the leaves ready to bind, saving thereby considerable labor. The cane should not be topped until ready for cutting. If this is performed sooner, the formation of sugar is immediately checked by the efforts of the cane to replace the lost heads or panicles. Some which I topped at the time of stripping, ten days before cutting, yielded juice which contained only twelve per cent. of sirup, while that from cane untopped until the day of using, yielded eighteen and twenty per cent. Neither would granulate. It can best be topped by hauling to the mill and laying the heads evenly and cutting them off with a hatchet.

897. "**Time of Cutting.**—Do not cut until the very day of using, if it can possibly be avoided. From the day it is cut it commences to deteriorate. This is a fixed fact. A change in the chemical constituents immediately begins which soon destroys the granulating power, and if the weather happens to be warm, brings on acetous fermentation.

898. "**Most Favorable Period for Manufacture.**—This commences when the seed is fully in the dough and continues until it is nearly ripe. Cane fully ripe a month before frost, was allowed to stand uncut and commenced growing acid, so as to require neutralizing agents, and both color and taste were injured. Acidity can be thoroughly neutralized by using sufficient alkali. In some very acid juice a tablespoonful of strong soda was required for a gallon of sirup. For a few days there was a decided smell of the alkali, but it presently passed away and the sirup proved to be quite a good article, and a portion of it has grained in the barrel.

899. "**Manufacturing Sirup.**—The first consideration is a good iron mill, with which one horse can grind cane enough in twelve hours to make forty or fifty gallons of sirup. Hedge's mill is the most reliable, and it should be placed so that the juice will run to the boilers; and of all that I have

seen, I prefer Cook's, though I do not believe it makes as beautiful sirup as the common pan and kettle. If pans are used, make them of galvanized sheet iron, from seven to ten feet long. Turn up the sides and ends of the sheets about two inches and finish by nailing them to solid plank ten inches high, so as to form an oblong water-tight box with iron bottom. As many as you wish may be set in furnaces, the horizontal flues of which should meet in one perpendicular chimney. The juice should be clarified in these and afterward boiled down until nearly done, when it should be removed and the operation slowly finished in a cast-iron kettle. The reason I prefer to finish in a kettle is this: When the sirup is completely done, it can be ladled out without the risk of scorching, which is so imminent in using the thin, flat pan.

900. "**Clarifying Agents.**—Of these there are several. Lime-water made from fresh lime is about as good as any. Our finest sirup was cleared with some refuse saleratus which had been thrown away by a merchant here as worthless. It did not injure the color in the least. Carbonate of soda answers very well, but colors the sirup somewhat. Sugar of lead is a splendid clarifier, but it is poisonous.

901. "**Profits of Sorgo Grinding.**—These vary from $50 per acre to $100, just as the business is managed. One large mill in an adjoining county broke up its owners; twenty-five acres of cane remained uncut in their field, and the quality of sirup was so poor that they could not sell it until it was refined. Others on a small scale realized quite a per cent. on the outlay and labor. The result of my own was about thus: When the mill, which was a very poor one, ran steadily, the profits were $8 a day of ten hours. My Cook's evaporator cost $47 50, and Douglass' mill $68, freight included. The season ought to commence, at the latest, on the first of September, and continue for two months, or even longer, if the cane is properly taken care of, and success in a domestic way is undoubted; but we do not know enough about the business as yet to render it safe to invest any great amount. With more experience, we can supply our own State with sirup, and sugar too, I have no doubt."

902. **Sorgo as Food for Stock.**—Upon this point Mr. Newberry says: "My horses, cows, and hogs have all had access to the pile of bagasse, and they eat it greedily. My milch cow will not touch hay or Hungarian grass, and she is in as good order as it is possible for a milch cow to be. My horses require very little fodder, and even the pigs chew away with commendable zeal."

Another Illinois farmer wrote to us in December, 1860, as follows: "Our horses, mules, and cattle have had no other fodder since cane came in, and the more mature the better they seem to like it. I tried cutting and curing the immature cane last year, and found it a failure. The mature cane is the form in which my experience would lead me to use it for fodder. The proper way is to cut and shock like corn. We have been feeding it all winter so far; the only preparation is to cut the long stalks in two so as to get them in the manger; the animals take care of it after that. The effect on milch cows, judging by our own, is very satisfactory. We have a very comfortable supply of milk from one cow, and her main feed is sugar-cane."

903. **The Yield per Acre.**—He also writes: "Our yield per acre did not come up to the general estimate; about one hundred gallons per acre was our product. We are satisfied our mill took out from 60 to 75 per cent. of the sap. We had a portable eight-horse-power engine and boiler, and a cast-iron mill, having two rollers fifteen inches in diameter and length, with set screws. Our evaporating apparatus was made of American sheet-iron, imitation of Russia, and consisted of three pans of capacity to hold over three hundred gallons of sap. We broke down in two respects: first, our machinery was inadequate to work up our crop; and second, we failed to make a perfectly satisfactory article, nearly all having a scorched taste.

904. "**Keeping the Cane and the Juice.**—We have demonstrated that cane cut up and shocked like corn, before frost, will keep perfect for a month after. Some of the most perfect sirup we have made was from cane a month old. But if the unripe cane stands until killed by frost, the thing is done for; two days of warm weather will then sour it; but the sap does not run into decomposition immediately. We ground out for one of our neighbors, four miles off, enough to make eighty gallons of sirup; the sap was taken home, and in the course of the next two days was worked up. This was not all ground at one time, but four or five different times. The sirup thus made was the most perfect of the season."

905. **Fruits of Experience in Growing Sorgo.**—The above writer says: "In conclusion, our experience (and we have bought it pretty dear) has satisfied us that the manufacture of the sorgo can only be made profitable in two ways—either in large establishments, with perfect machinery and skill, or on a small scale by farmers, for their own use. The latter is the most favorable view, as to its prospective value at the North. We have no doubt human health and happiness will be largely increased by the improvement in diet which will result from bringing this valuable article of food within the reach of all. I am entirely satisfied of the fact that it can be grown in this latitude (41° 25′) successfully. The difficulty is making the manufacture of the cane into sirup profitable after it is grown."

906. **Chemical Character and Analysis of Sorgo.**—A writer in *The Farmer and Planter*, Columbia, S. C., says: "Careful experiments made by distinguished chemists during the last year have settled the point that the sorgo belongs to the family of grasses which secrete 'glucose' or fruit sugar—not crystallizable, or cane sugar. The value of cane sugar, compared to glucose or grass sugar, is three to one. We may give up, then, the hope of making sugar profitably. Carefully conducted experiments during the last year, however, have satisfied the writer that a very good sirup can be manufactured at the rate of fifty cents per gallon, and for even less, by the small farmer who is not entirely engrossed with the cotton crop. This will prove an in-

estimable blessing, bringing it within the means of almost every farmer owning a horse and an acre of ground, to provide the family with a luxury."

This corresponds with our continually expressed opinion, that it was not worth while for those who grow the cane to think of making sugar, but confine the manufacture entirely to sirup.

Dr. Augustus Voelcker, of the Royal Agricultural College at Cirencester, England, has published some analyses of Chinese sugar-cane grown on the college farm. The analysis was made September 26, 1859, with the whole plant, with the following result:

	In natural state.	Dried at 212°
Water	81.80	—
* Albumen	.37	2.03
* Other soluble protein compounds	1 16	6.36
Sugar	5.85	32.15
Wax and fatty matter	2.55	14.01
Mucilage, pectin, and digestible fiber	2.59	14.26
Soluble mineral matters	.74	4.06
†Insoluble protein compounds	.66	3.62
Indigestible woody fiber (cellular)	4.05	22 25
Insoluble mineral matters	.23	1.26
	100.00	100.00
*Containing nitrogen	.245	1.34
†Containing nitrogen	.106	.58
Total quantity of nitrogen	.351	1.92

"The sorgo contained nearly 6 per cent. of sugar, which is about the same proportion as in carrots. The canes proved sweeter near the ground, some of the stumps yielding 7.65 per cent. of sugar. Stems cut about twelve inches from the ground yielded 3.60 per cent. of sugar—not quite half the quantity found in the lower part The proportion of sugar and crude fiber was: in stems cut two inches above ground, per-centage of sugar, 7.65; per-centage of crude fiber, 6.50. In stems cut twelve inches above ground, per-centage of sugar, 3.60; per-centage of crude fiber, 13.01; while the principal or main stem was quite sweet, the stolons or side shoots were still bitter. It thus appears that all do not ripen together; the central or oldest stem is perfect before the lateral shoots."

Dr. Voelcker found the unripe canes in August contained no sugar whatever. He says: "The taste of the plants on the 23d of August was anything but sweet. I did not expect, therefore, to find much, but I was unprepared to meet with a total absence of sugar."

907. **Effect of Frost on the Canes.**—As most of the directions about harvesting the canes say that they must be cut before frost, we give the following counter statement from Preston Eyre, Darlington, Penn. He says: "A neighbor allowed his cane to stand about one month after it was frozen entirely dead; he then cut it off in the morning, when the juice was frozen solid, and laid it in the sun, and in the afternoon expressed the juice with iron rollers; the result was 165 gallons of juice, 5 of which made 1 gallon of excellent sirup, even superior to my own, which was cut before freezing.

"I cultivated a small patch in my garden; I cut it off before the frost affected it; I expressed the juice with iron rollers the same day, and had 30 gallons; boiled it down next day and had $5\frac{1}{2}$ gallons of sirup; it had somewhat of a green taste, which I think is destroyed in the process of freezing; for let the season be ever so favorable, there will be some stalks not matured, but by freezing they are assimilated and lose that green taste so perceptible in the immature cane.

"I have tasted several samples of sirup, and the best was manufactured from cane which stood several days after being frozen hard, and made without using lime or any other acid-destroying agent. My conclusions are, that the cane does not lose any of its saccharine qualities by freezing, but they are rather improved."

Col. A. T. Morris, of Indianapolis, gives a detailed account of his success in making sirup. He says: "I made two efforts, both unsuccessful, to produce sugar. I suppose that my want of success was mainly owing to the fact that the cane had all been frozen. The effect of the frost was to diminish the quantity of juice; also to neutralize, to some extent, its acid properties, and slightly increase its density, as indicated by Beaumé's saccharometer.

"The juice of my unripe cane, before frost, marked seven degrees, Beaumé; that of the ripe cane, nine degrees. After the frost, the juice marked ten degrees."

908. **Yield per Acre in Indiana.**—"Myself and friends have made about 1,500 gallons of sirup. My cane yielded 225 gallons of very thick sirup to the acre—requiring about six gallons of juice to one gallon of sirup. That grown by others yielded at the rate of 320 gallons per acre. I think 300 gallons may be relied on here as a fair average crop."

Col. Morris says: "I tested juice from several fields in this vicinity, and invariably found that the small, thoroughly ripe cane produced the strongest juice—the large, vigorous growth was very generally inferior from one to two degrees. I also found that the bottom of the stalk was not as sweet as the middle, nor the middle as sweet as the top. The juice from each third of the stalk indicated one degree more for the top third than the middle, and this one more than the bottom."

909. **How the Sirup was Made, and its Cost.**—"I filtered the juice, as it came from the mill, through finely powdered charcoal, placed in a barrel with a false bottom, covered with blankets, in the manner used in rectifying whisky. The juice thus filtered was boiled in the usual way, and produced a sirup, I think, equal to any I ever saw. This process I found to require too much labor and time. The charcoal soon became impervious, and had to be renewed, rendering its use too troublesome and expensive when a large amount of sirup was to be made.

"After filling the large pan from the mill, I mixed in it a sufficient quantity of lime-water to nearly neutralize the acid in the juice, using litmus paper as a test. I also mixed, at the same time, about three pounds of ivory-black and one half dozen of eggs to every 100 gallons of juice, stirring all together thoroughly. The juice was then heated to near the boiling point, and the fire then removed from the furnace and the juice not disturbed until sufficiently cool to be in a quiescent state. The scum was then removed, and the remainder drawn off through a flannel bag into the other pans for boiling. Before boiling, a small quantity of dissolved borax was added, after which it was boiled moderately and skimmed, until the quantity was evaporated to about one third of its bulk; then the boiling was as rapid as possible, until the sirup was produced. By this process, I have made an article which is very generally considered nearly, if not quite, equal to the best of the golden sirup in our market.

"I attempted to boil the juice in ordinary iron kettles, arranged in a furnace, in the way usually adopted here to manufacture maple-sugar, but found it impossible to avoid burning the sirup against their sides. I then procured four pans, with cast-iron bottoms and wooden sides. Three of them were two and a half feet wide and three and a half feet long, with sides fourteen inches deep; and one five feet long, and same width and depth as the others. I placed three of these pans in one furnace, made of brick, and placed the largest one in a separate furnace at right angles to the first. The smoke-stacks of the two were placed together. The bottom of the large pan was put on a level with the top of the small ones, so as to draw out its contents, by a stop-cock, into the adjoining small one. With this arrangement, I could concentrate about 400 gallons of juice each day, consuming about three fourths of a cord of wood.

"It cost about twelve cents per gallon to make my sirup, estimating the fodder and seed to pay for the labor of cultivation, and not allowing anything for interest on the cost of the mill and boiling fixtures."

910. **Best Mode of Growing the Cane and Feeding it to Stock.**—Upon this question Col. Morris says: "My experience and observation induce the belief, that the best mode of growing the cane is to thoroughly break up and harrow the ground, then cross off at right angles, with something that will merely mark the surface, giving hills three and a half or four feet apart. Allow about six seeds to grow in each hill, and pull off all suckers that come from the root too late to ripen as soon as the main stalk, and strip from time to time all heads that make their appearance at the joints of the stalks. This method of planting will allow the use of the cultivator earlier, with less liability to cover up the young cane, diminish the amount of hoeing, and, I think, would require but little if any more labor than a corn crop. By pulling off the suckers that start too late to ripen, and the seed-heads that appear at the joints, I think the vigor and perhaps the quality of the growing stalks would be increased.

"About the 1st of June I planted two acres in drills about four feet apart, running north and south, planting one seed every eight or ten inches. The soil was not rich, but light and sandy. I hoed and plowed twice. Its growth, after being plowed, was very rapid, and most of it was ripe about the middle of October. From two to five full-sized canes grew from each seed; perhaps the average would be three. The average hight was about ten feet, and the average diameter about one and a half inches at the ground. I made no attempt to ascertain the amount of fodder and seed yielded per acre, but have fed both—also the ripe and unripe stalks—to horses, cows, and hogs. They eat every part of the cane greedily, and, so far as I observed, seemed to thrive on the food equally with any other.

"While making sirup, I fed the scum to my hogs, but on one occasion suffered it to remain in a barrel about twenty-four hours before feeding, when I found vinous fermentation had commenced, and it produced its legitimate effects—making some twenty hogs seriously drunk."

911. **A Cheap Boiler.**—"It is constructed as follows: The sides are of plank one and a half inches thick, one foot wide, and four feet long. The bottom and sides are of a continuous piece of sheet iron, six feet long by two feet wide, the ends of the iron turned up to form the ends ot the boiler, nailed on the wood. It is four feet long and two wide, holding eight cubic feet, and presenting an evaporating surface of eight square feet. I rest the edges of the boiler on brick-work, the fire passing lengthwise under the bottom. Its cost was not over two dollars."

912. **A New Plan of Extracting Cane Juice.**—H. G. Bulkley, of Kalamazoo, Michigan, has made a successful experiment upon a new plan of extracting Chinese cane juice, and recommends it to others, as it saves the cost of a crushing-mill, and enables parties provided with ordinary farm implements to make a full supply of sirup for family use at a very little expense. The plan is to cut the canes in a straw-cutting machine, and then steam them until quite soft and press out the juice in a common cider press, and then proceed with the evaporation as with maple sap. Boiling the cut canes will answer where no conveniences for steaming exist, though steam is preferable, and any ingenious man can make a steamer out of a cask, an old gun-barrel, a common kettle with a wooden lid cemented tight with clay and cow-dung mixed into a paste. But, after all, if the steaming process should prove more economical than grinding the green stalks, it will be found preferable to erect works designed for the purpose especially. Mr. Bulkley says that he pressed his steamed stalks while hot, in a small cider press, making them dry enough to burn; and made twenty-five gallons of good sirup by the work of two men and a boy in two and a half days.

913. **Description of Cane Mills.**—The best cane mills are ponderous iron rollers, some five feet long and thirty inches in diameter, lying parallel, two at bottom and one at top, touching both the others, the canes being mashed by the first contact and squeezed dry, or as nearly so as possible by the second contact. The canes are fed to the mill upon a long apron or cane carrier, the whole driven by a powerful steam-engine.

The next best mill is one of similar form driven by horses. Then there are upright mills of two rollers, both of wood and iron, in the South, of various degrees of excellence, some of which do not save half the juice.

Good small iron mills, for horse-power, for grinding the canes of sorgo, have been built in Philadelphia and Cincinnati. Without a good mill it is as useless to attempt sugar-making, as it would be to attempt cider-making without a mill to grind the apples. Cider may be made by mashing apples between two stones, and squeezing out the juice in any rude way; and so may sirup be obtained in the same rude way from sorgo, but the process will not be a profitable one.

An iron mill for family use on a small scale is described as follows: A pair of iron rollers, 7 inches diameter and 12 inches long, set in a frame one eighth of an inch apart, with spout to catch and collect the juice, and a crank turned by hand.

914. **Boiling the Juice.**—Boiling must be done in the same careful manner that good maple-sugar makers pursue. As soon as the juice begins to boil, the albumen of eggs, blood, or milk will coagulate and rise, bringing with it most of the vegetable mucilage, gummy matter, and dirt, which must be carefully skimmed off, but not before it really does boil, which it will do at 215 degrees Fahrenheit. It will be best to take the kettle from the fire, or put it out, as soon as the scum has arisen, and let the juice cool a few minutes before skimming it. You may then boil again, until nearly half evaporated. The true rule is for the saccharometer to mark 15 degrees Beaumé. It marked in Mr. Lovering's experiments 8 degrees to 12 degrees in the clear juice before boiling.

After this second boiling, the juice should be cooled to 160 degrees Fahrenheit, and more eggs, blood, or milk added, and again brought to the boiling point, and again stopped boiling and allowed to become quiet and then skimmed.

Decolorization is the next process. This is done by decanting the liquid through granulated burnt bones (animal charcoal), from three to five feet deep. It may be filled into any long, narrow vessel, set on end, through which the liquid is to be leached. This filter must be prepared as a careful housewife prepares her leach, so that no ashes will be washed down into the lye. A board with holes in it, and a piece of wire gauze, may be fitted in the barrel above the bottom, and the bone-black thoroughly wet with hot water, and that drawn off before putting in the juice. A thin blanket may be used instead of wire gauze.

Boiling down the filtered liquid is the next point, and this requires care and skill, combined with experience. Nothing else will answer; for,

"If we do not boil enough, the sugar contained in the solution will not crystallize when cold; or,

"If we boil too much, the molasses will become so thick when it cools, as to impair the crystallizing of the sugar, and can not be separated from it.

"But how shall we know when to stop the boiling?

"*By the heat of the boiling liquid*, as marked by the thermometer.

"Pure water boils at 212 degrees Fahrenheit's thermometer. You can not make it hotter without changing it to *steam*.

"The sorgo juice, being a solution of about fourteen per cent. of sugar and molasses, etc., in water, becomes three degrees hotter before boiling, and boils at 215 degrees Fahrenheit. As the water evaporates, a greater heat is required to keep the concentrated juice boiling; in other words, the juice grows hotter and hotter. When it reaches the heat marked on the thermometer 238 degrees Fahrenheit, there is just enough water left to enable the sugar to separate from the molasses when cold."

A thermometer is therefore an essential implement in sugar-making.

The water being evaporated, the sugar will crystallize as the sirup cools, if all the processes have been conducted perfectly, and if not, you will have instead of sugar an excellent molasses. Sometimes that, if kept exposed to the air, will half or more crystallize, weeks after it is put away.

915. **Will the Sorgo Juice Make Sugar?**—That question is settled that it will, notwithstanding all that has been said about its containing no true cane sugar. Mr. Joseph S. Lovering, the great sugar refiner of Philadelphia, has furnished the evidence that it will make sugar; not only raw sugar, but perfectly white, granulated, sound refined sugar. A good many other persons have also made sorgo sugar.

Among others, a gentleman living in Evansville, Ind., wrote me that from sixteen gallons of juice he made between ten and eleven pounds of granulated sugar by following the process given in the "United States Dispensatory," page 633. We have now before us a handsome sample of sugar, made by Mr. Miller, of Laporte, Ind., in a boiler contrived by him, made of cast iron, circular form horizontally, with a division in the center, and set on a pintal, so that it can be turned off the fire as easily as a kettle is swung from the fire in the old kitchen fire-place, when hung upon a crane. Still we doubt whether in the ordinary mode of household manufacture, good dry sugar can be easily or profitably made from sorgo juice. To make sugar, either from the sorgo or the tropical cane, successfully and cheaply, requires costly apparatus. The principal difficulty is getting rid of molasses.

One man details his experience as follows: I brought the juice to the boiling point slowly, skimming as the impurities arose to the surface. After removing the first thick scum, I boiled as fast as possible, until the sirup began to thicken; then slackened the fire and evaporated slowly, until the sirup would barely run when cold. It was then put in vessels and set aside. In two or three days the mass was filled with crystals. This was all very easy, so far, but I found the draining tedious. This I did by putting the mass in a conical bag, made of thin cotton cloth."

As every family, with the hand-mill above described, can grind cane enough at odd time to make a barrel of choice sirup, let that suffice, and leave sugar-making to large establishments; for it requires more apparatus than it does for maple sugar.

The experiments of Mr. Lovering were very minute, and conducted with great accuracy, and proved to his satisfaction that a fair crop of sorgo will give 625 lbs. of sugar to the acre, of as good a quality as a fair average of cane sugar. He published his experiments in detail in a pamphlet, and that was republished in the New York *Tribune*, and in several other papers. It is too long to print in whole in this book, and we only give his conclusions in form of a synopsis:

"*First*—That it is obvious that there is a culminating point in the development of the sugar in the cane, which is the best time for sugar-making. This point or season I consider to be when most if not all the seeds are ripe, and after several frosts, say when the temperature falls to 25° or 30° F.

"*Second*—That frost, or even hard freezing, does not injure the juice nor the sugar, but that warm Indian summer weather, after the frost and hard freezing, does injure them very materially, and reduces both quantity and quality.

"*Third*—That if the cane is cut and housed, or shocked in the field when in its most favorable condition, it will probably keep unchanged for a long time.

"*Fourth*—That when the juice is obtained, the process should proceed continuously and without delay.

"*Fifth*—That the clarification should be as perfect as possible by the time the density reaches 15° Beaumé, the sirup having the appearance of good brandy.

"*Sixth*—That although eggs were used in these small experiments, on account of their convenience, bullock's blood, if to be had, is equally good, and the milk of lime alone will answer the purpose; in the latter case, however, more constant and prolonged skimming will be required to produce a perfect clarification, which is highly important.

"*Seventh*—That the concentration or boiling down, after clarification, should be as rapid as possible without scorching—shallow evaporators being the best.

"With these conditions secured, it is about as easy to make good sugar from the Chinese cane as to make a pot of good mush, and much easier than to make a kettle of good apple-butter."

We dissent from his last proposition, and conclude by recommending farmers to confine their operations to making sirup. That they certainly can make, of superior quality.

916. **Sorghum that has No Saccharum.**—We have no doubt of the fact that two kinds of seed have been disseminated through the country so identical in character as to deceive the most careful observer, and producing canes so identical in appearance as to be undistinguishable, yet one affords a sweet juice, convertible into sugar or sirup, while the other has but little more saccharine property than broom-corn, which is also a sorghum.

This false cane is the *Sorghum vulgare*, called in some sections Turkey corn, Guinea corn, chocolate corn. This is a trifle earlier, and grows high, erect canes, which are erect because they are light. The sweet sorghum canes are heavy because they are loaded with sweet, and frequently for that reason, and for their high and slender growth, are prostrated by the winds. One plant of the false sorghum is sufficient to adulterate a whole acre of the true in this way. The sorghums blossom first on the uppermost part of the panicle, and then by degrees follow the panicle to its base, where it ceases. It being a long time in blossom, the pollen of the false, by the winds and insects, has the first and best opportunity to impregnate the true as soon it begins to blossom. It can readily be seen how easily a whole field of seed may be adulterated by a few seeds of the false intermingled, without the cultivator having any knowledge of the fact, until a subsequent crop; and when it is considered that the seed is identical in appearance with the true, the mischievous consequences can readily be appreciated.

"However this adulteration may be, sufficient facts are elicited to warn the Northern cane-planter to beware of a cheat that can only be detected after his toil has matured a crop of either sweet or tasteless canes. This tasteless cane was a common plant in Connecticut forty or fifty years ago, and during the war of 1812 it was cultivated for its fancied value as a substitute for coffee; and it is now asserted that at that time there were sweet canes as well as those not sweet, and many persons believe that the true Chinese cane was grown at that day, without any knowledge on the part of the cultivators of its being a sugar-producing plant."

It certainly requires the utmost care on the part of cultivators to keep the seed pure. Every one must utterly debar the cultivation of *Sorghum vulgare* on his own premises, and as far as possible on his neighbor's; and if by chance his cane has become adulterated, discard the seed, and procure that which is pure, at whatever cost.

917. **Cost of Growing Sorgo and Corn Equal.**—A farmer of Chester County, Penn., has carefully ascertained the cost of growing sorgo to be the same as growing corn. The profit is greater. He says: "My calculations of the profits of sorgo are as follows:

One acre will produce 1,500 gallons of juice, which at 4 gallons for 1 will produce 375 gallons sirup, which at 30 cents per gallon is	$112 50	
And 30 bushels seed, worth 40 cents per bushel	12 00—	$124 50
Deduct crop of corn, 50 bushels per acre, worth 60 cents per bushel delivered at market		30 00
Leaves a difference in favor of sorgo		$94 50

"The cost of raising the corn and sorgo until both are ready to cut from the ground—the one to husk and the other to express the juice—is exactly equal. The husking, cribbing, shelling, and getting to market the corn will probably cost quite as much money and labor as it will cost to express the juice of the cane and convert it into sirup.

918. **Stock Injured by Eating Sorgo Bagasse.**—The statement given by some sorgo growers and manufacturers, that the bagasse is good feed for stock must be received with some caution. An item published in 1860, in the Independence (Iowa) *Guardian*, gives an account of the destruction of seven head of cattle, belonging to I. G. Freeman, from eating the refuse of Chinese sugar-cane, after it had been compressed in the mill. The coating of the stalks is of a very vitreous character, and in the stomach it produced violent inflammation. A post-mortem examination in that case revealed this as the cause of death.

919. **Sorgo Sirup Vinegar.**—In regions where cider vinegar can not be made easily, a very good substitute may be obtained from the juice of sorgo. The quality will be improved by boiling it about one half away, though we believe a pretty fair vinegar has been made from the juice without boiling. It may be exposed to the air in open vessels, and should be frequently stirred to allow the atmosphere to come in contact with it, because it is by the oxygenation that vinegar is formed of any fruit juice, which converts the sugar into acetic acid. Vinegar-makers leach cider through barrels filled with shavings of some sweet wood, such as beech or maple, for the purpose of exposing every drop to the action of the air, to hasten the oxygenation, and the same plan may be advantageously adopted in the manufacture of vinegar from sorgo.

SECTION L.—MAPLE SUGAR-MAKING.

THE *Acer saccharinum* has long yielded sugar to the pioneers of American settlers in the forest. Charlerois, in his history of Canada, written in 1721, speaks of the manufacture of sugar from maple-trees, and gives the process, and says it was first produced by the French immigrants, who taught the art to the Indians, who were previously ignorant of it, though the reverse of this has long been believed; that is, that the settlers found the Indians already in possession of the secret, and learned the art of them. Although there are none of the difficulties in the way of converting maple sap into sugar, that we find in sorgo, we believe it is better economy to convert the sap into sirup or molasses, where maple orchards are convenient to large towns, which will always afford a market for a real nice article of maple sirup at a high price. We have already given full directions as to Chinese cane, which will make excellent sirup, and will only make poor sugar, and that with much difficulty. Maple sirup is more easily converted into a very palatable but not very sweet sugar. It is never, at best, worth over two thirds of the price of pure cane sugar for family use, while the sirup is quite the reverse. We had rather have a gallon of maple sirup than a gallon and a half of golden sirup, or two gallons of Orleans molasses. Although maple sirup is made with very little trouble, it requires much experience and great care to make good maple sugar.

Since the sugar-maple is one of the handsomest of all of our beautiful American forest trees, and is as easily grown as an apple-tree, it is somewhat surprising that it is not more cultivated, and its delicious products more used by farmers' families. To aid in this, either from cultivated or natural trees, we shall give in detail the process of maple sugar manufacture.

To those to the manner born, or bred in the camp (of sugar-makers), we do not suppose we can offer acceptable advice about the how to do it, or "how not to do it;" but to a few others, who have not yet learned the best way to conduct the maple-sugar business, we think we can say a word that will be useful. In the first place, get ready. For that, there is a very good time; it is *now;* you never will find a better one.

920. **Preparation for Sugar-Making.**—No matter what is the season of the year, if it is mid-summer, or mid-winter, and you intend to tap your maple-trees next spring, you can get your spouts, pails, sap holders, kettles, sugar molds, sirup casks, etc., ready. At any rate you can read this article upon maple sugar-making and learn how.

921. **Tapping the Trees.**—Never tap your trees with an ax, even upon land that you are going to clear, because you may not live to clear it, and your successor may desire to save some of the trees that your wrong act has spoiled. Besides, boxing may teach your son the wrong way to do it.

The right way is to bore the trees on the sunny side, two feet or more above the earth, with an auger not over one inch diameter, and at first not over half or three fourths of an inch into the wood, with a slant upward. This hole may be deepened or increased in diameter after the surface becomes so dry that the flow of sap is checked. The *right time* is when the winter is so far over that we begin to have freezing nights and thawing days. Then be ready for sugar-making.

922. **How to Make Spouts, and How to Use Them.**—To conduct the sap into the buckets, use iron spouts which will cost you only the price of thin inch-and-a-quarter wide hoop iron, cut in lengths of two to four inches by your own hands with a small, cold-cutting chisel, using the end of a hard-wood block for an anvil. Now grind one end sharp before you make them into troughs, which you can do almost as fast as you can count, as follows: Bore an inch hole through a hard log and saw it asunder so as to leave half of the hole in one end; drive two nails upon one side, an eighth of an inch from the edge for a gauge; lay the flat piece of iron over this hollow, and a round bolt on it, and hit that with a stout hammer or an old ax. You can improve upon this by extemporizing a hand-press, both for cutting and shaping your spouts. You need not go to a blacksmith's, and you can not make wooden spouts half as fast, and they will not last half as long.

Drive your spouts into the bark only, and when the season is over, pull them out and store away, unless you intend to die before the next year.

Instead of boring a first or second time, you may use a gouge, cutting out a clean chip. This will not injure the tree. Boxing or boring with a slant down, holds water and produces decay.

This is our opinion about spouts. Now here is somebody else's opinion, which may be equally good. He says: "There are two objections, in my mind, to the iron spout. The first is, it leaves the hole entirely exposed to the air, and the surface soon becomes dry, and the flow of sap is checked. The hole should be closed as nearly as possible, without obstructing the flow of sap. For this reason I prefer the wooden spout; and the expense is no more. There are in most towns in New England, shops and machinery where spouts can be made from spruce or pine at a cost of not more than one dollar per hundred. Where there is no such facility, they can be made in long winter evenings from elder or sumac, which grows on nearly every farm, with no other tools than a saw, a jack-knife, and a piece of wire with a handle on one end to remove the pith.

"My second objection to the iron spout is, when driven into the bark it is liable to fracture it and cause an unnecessary wound to the tree."

Wooden spouts can also be made of any free-splitting wood, cut ten inches long and one and a quarter inches thick, which is split by a gouge or crooked iron, to give the right shape. Always commence splitting each block in the middle, and work it so till each piece for a spout is thin enough. One end is to be sharpened, and the hole made with a gouge, and the spout driven in as recommended for the iron spouts. Some bore holes slanting downward and drive a plug-spout in the hole. Still there is nothing, in our opinion, so good and cheap as iron spouts, made of scrap sheet iron or hoop iron, swaged to a trough shape, and ground sharp at one end, so as to drive into the bark —never through it—below the cut from which the sap is to flow. This cut may be made with an auger, gouge, or even an ax, if care is used to make only such a smooth, shallow cut as will soon heal over. Chopping great, rough holes into trees to get the sap is an act as foolish as killing the goose that laid the golden egg.

923. **Sap-Buckets.**—The best sap-buckets, and in the end the cheapest, are made of tin, to hold four gallons, and just enough tapering to pack together, with a loop in the rim-wire to hitch upon a wrought nail, driven into the tree. Such buckets should not cost over 25 cents each—perhaps not over 20 cents. They should be stored dry, in a dry place, in piles bottom up, and be good for your grandchildren.

Painted pails make cheap, good sap-buckets. You can hang them by the bail upon a nail set slanting, or else by a piece of small wire twisted in one ear.

Home-made pails can be made without much cost during the winter, if you have any genius for coopering, and will use the surplus heat of the stove or brick oven to season your stuff. Leave one stave long enough to bore a hole to hang upon the nail. Do not depend upon things that you can pick up to catch sap, and if you catch a fellow upon your premises making sap-troughs, take a birch sprout and start the sap out of him.

One old sugar-maker recommends making tin sap-buckets of a square form, of two sheets for the square sides and half a sheet for the bottom, with just taper enough to fit together when in store. The tin should be rolled around a wire at the top, with a loop to hang by, or else with a hole under the wire large enough to hang over a wrought nail head or stub horsenail.

We say wrought, because they must be pulled out of the trees when the season closes.

If sap-buckets are not home-made, then tin is undoubtedly the most economical, and they may be kept clean more easily than any other kind, and never impart any sourness to the sap, and would soon pay for themselves in the increased value of the fine sugar and molasses afforded by their use. When sap-buckets are hung upon the tree, as they always should be, the spouts will rarely need to be over three inches long, and being close to the top of the bucket, the sap will not be blown away and lost, as it frequently is in falling a foot or two.

924. **Storing the Sap.**—It is very bad economy to neglect providing a sufficient reservior for sap. In some wooded regions, where suitable timber can be had, a trough that will hold four or five barrels can be dug out without any expense, for the man who is tending the first boiling can do the work. Where a trough can not be made conveniently, a vat can be made of plank, set in a frame to key up tight with wedges. Sometimes a molasses hogshead can be obtained conveniently. A liquor cask will answer if it is brought home some weeks before wanted, and filled with water. If you can arrange your storage vessel to stand above the level of the boiler, it will save much trouble, as you can thus run the sap through a trough into the boiler.

925. **Boilers and Boiling Sap.**—Sap-kettles are antiquated. If you possess any of these, use them for the storage of sap, or concentrated sirup, and get a set of sheet-iron pans. These you can also make yourself. See how cheaply. Buy good stove-pipe iron in large sheets; punch two rows of holes, not in exact straight lines, around the edge, one row close to it and the other an inch and a half from it. Nail this upon a frame made of one-and-a-quarter-inch stuff, six inches wide, with one row of nails, which should be large-headed tacks or small wrought clout nails, in the edge of the frame, and the other in the sides, upon which the edges of the iron are turned up all round. You may, if you fear having an untight joint, use a little white lead, but it is not generally necessary. An old sugar-maker thinks copper bottoms would be more economical in the long run.

A boiler has been patented that is made in such a way that by a motion given to it, the sap is made to flow into a series of troughs over the heated flues, in a small stream which evaporates rapidly. A man who has made sugar in Ohio since 1851, says: "I prefer heavy cast-iron kettles to sheet-iron pans, but would like them if of oblong shape with straight sides and ten inches deep, set over an arch. I use four eighteen-gallon kettles, and have often boiled down and sugared off 100 pounds a day; of course working all night.

"We gather our sap in tight barrels. Two make load enough for a yoke of oxen to haul on a sled. We have a convenient place, so that one man can roll up and empty into the reservoir. Two hands can gather twenty barrels in half a day. We boil in all the kettles, having spouts to conduct sap into each as fast as it boils away. It is too much work and exposure to heat to dip from one kettle into another, and nothing is gained by it. When we first start our four kettles, we can boil away two barrels an hour. After the sap gets sweet, it will not boil away so fast. We boil in about enough for ten pounds to each kettle, and then boil down to sirup, strain off, wash and scour the kettles, and fill up again. By boiling too long we lose time and spoil the sirup. Great care must be used to keep the sirup clean. If necessary, use milk or eggs to clarify with. I do not recommend claying sugar, and all for sale I make in cakes—it brings more."

926. **The Furnace and Setting Pans.**—Build two straight walls as long as all the pans you will use, and a little less wide apart than the width of your pan, raising at the end of each pan so that the second will discharge the juice through a cock or spout closed by a valve or cheap gate. Where the ends of the two pans meet, there must be a flat stone, or brick-work, or iron plate. There is no occasion to build the pans fast in the furnace—they are more convenient movable. If you have pans enough to use up all the heat in its passage under them to the chimney, you will be surprised to see how rapidly the water evaporates. You must fill in the bottom of the flue so as to keep the fire up to the bottom of the last pan.

927. **The Process of Making Sugar and Molasses.**—When the sap is boiled to the right point, which experiences teaches, draw it from the last pan and strain it through flannel, or cloth of somewhat close texture, into a clean kettle or tub, and let it cool. The tub is the best, with a cock half an inch above the bottom, so as to draw off the clear liquor, leaving the sediment that passed through the strainer to be re-filtered. In the decanted liquor, put a quart of milk, or, still better, a pint of milk and two or three eggs to ten gallons, and heat slowly and skim carefully. The eggs should be well beaten with the milk, and thoroughly stirred into the sirup before it is heated. The kettle should not be over half full, and should be on a crane so as to swing off suddenly, or if set in an arch, with a furnace door and damper, by which the fire could be controlled in an instant, as upon this depends success; and great care is necessary to prevent scorching after the sirup begins to grow waxy, from which time until it is sufficiently boiled, the fire must be very gentle and under control.

Waxy sirup will make drained sugar, leaving a considerable residue of molasses to be re-boiled or kept for use. Brittle, waxy sirup is required to make cake sugar. For dry grained sugar the sirup must be concentrated before stirring, until when dropped upon snow and suddenly cooled, it is nearly as brittle as rosin. To make white sugar, the sirup when strained must be passed through animal charcoal several feet thick.

Filtering through pulverized burned bones—animal charcoal—removes the coloring matter and other impurities. Charcoal is a purifier and acts both chemically and mechanically, but when made of wood it absorbs and wastes the sirup. Sand is only a mechanical strainer. Neither will injure the quality of the sirup, but only animal charcoal can be recommended.

Sugar is also made white by filtering white sugar through it, in draining molds. That is simply mechanical—washing the molasses from the grains. It is also whitened by covering the molds with a coat of plastic clay. Whitening is not at all important, if the sirup is well strained and clarified with albumen, and the sugar not scorched. It will then be rich, clean, and possessed of that delicious maple flavor that constitutes its greatest value, whether white or brown.

Waste nothing. Wash all the sweet out of everything, and reconcentrate. Study economy in everything. Upon this alone depends the success of sugar-making. Do not suffer a hand employed in your sugar camp to ever carry such deadly weapons as guns and rum bottles, nor articles so destructive to success as cards, dice, dominoes, and novels. You must watch and work, and then you need not doubt success. Sugar-making is pleasant, healthy, hard work. A camp is no place for lounging.

While boiling, large quantities of sap should not be poured in at a time, as that will stop the boiling and make irregular work; but a reservoir should be placed above the boiler, into which a faucet should be inserted, and the sap allowed to run in a constant stream, which a little practice will enable the operator to regulate to correspond exactly with the evaporation. A stop-cock should also be placed in the boiler to draw off the sirup.

A correspondent writes from Windsor, Vt., as follows: "Two sheet-iron pans, four feet long and two feet wide, set in a brick arch, one forward of the other, will be sufficient for a sugar orchard of 300 trees, and will boil the sap to sirup in about twelve hours. Put the sirup, after straining through flannel, into a cask, and let it stand two days. Then draw it off and boil it down in one of the pans. I have seen sugar made in this way as white as loaf sugar. In my opinion, milk or eggs should never be put in sirup, as I can not see why any advantage should result from it; and I know it has been practiced with injury to the sugar, and waste, as considerable sweet is thrown out with the milk and egg."

We can not see how the milk and eggs can injure the sugar, since the office of any albuminous substance added to the sirup is simply to gather up and hold all such impurities in such a manner that they can be easily removed. In short, dirt that is so fine that it can not be strained out will attach itself to the white of an egg, so that it can be lifted out with a skimmer as easily as a potato. There is no need of waste of any sweet, because it can all be washed out in sap or partly concentrated sirup.

928. **Making Sugar on a Small Scale.**—J. Herrick, of Lyndeborough, N. H., wrote to us in 1857 as follows: "My orchard consists of seventy-five trees of second growth, scattered along walls or in a pasture of fifteen acres. I tap with a three-fourth-inch auger four feet from the ground, and hang the bucket by a ring, on a hook driven into the tree so close to the spout that the wind will not waste the sap. I tap at this hight that cattle can not disturb the bucket. Some might object on the ground that the lower a tree is tapped the more sap will run. This is not the fact, for the sap will flow as

freely by cutting off a topmost branch as it will from a root of the same size laid bare in the ground. And again, any one may learn this fact from the red squirrel, who, by the way, is a famous sugar-maker, and knows when to tap a tree and where to do it. He performs his tapping in the highest perpendicular limbs or twigs, and leaves the sun and wind to do the evaporating, and in due season and pleasant weather you will see him come round and with great gusto gather his sirup into his stomach.

"I make only molasses, and clarify in the following manner: I take the sirup when of proper consistence, and while hot strain through a thick cloth into the kettle for clarifying; and when cool, for every four gallons put in one egg and a half pint of new milk, well beaten together and mixed with the sirup. Let no further agitation be had by stirring. Raise the heat gradually to boiling point, and all the impurities will rise at once to the surface, and must be quickly removed with a skimmer as long as any comes up; this will leave a sirup perfectly clear, to be evaporated either to molasses or sugar. If the egg and milk are put into the sirup when hot, the albumen of each is charred so that it will form no adhesion with the impurities, and of course will not rise together to the surface. I think that the rapid evaporation of the sap, in sheet-iron pans, will make a more clear and light-colored sirup than when done in deep, thick kettles; at any rate, it can be done at half the expense of time and wood. Mine has been a small enterprise compared with many in this town who have orchards that number three or four hundred trees. Six years ago I constructed a building for boiling, the whole, including a brick furnace and sheet-iron pan for evaporating, at a cost of \$20; 75 buckets cost \$10, which makes the whole capital \$30. My son has done all the labor of gathering and boiling this season, at a cost, including ox help, of \$8. I have used 1½ cords of hemlock wood at \$1 75 per cord, \$2 62; and have made 29 gallons of molasses of a consistence that it shall not ferment in the hottest of weather. This is selling here at this time for \$1 34 per gallon. The result of my orchard is as follows: Interest on capital, \$1 80; labor, \$8; wood, \$2 62; total, \$12 42. 29 gallons molasses at \$1 34; total, \$38 86. Deducting labor, wood, and interest leaves \$26 44, as the result of about eight days' labor."

Maple sugar-making is truly a domestic institution. A woman in Van Buren County, Mich., made 61 lbs. of sugar and 2 gallons of molasses from 13 trees, the sap of which she boiled on the cooking stove. From 290 trees, in the above county, one family made 1,800 lbs. of sugar and 40 gallons of molasses. From 90 trees, another family made 400 lbs., besides a supply of molasses for family use. One Vermont boy, 16 years old, in a camp of 163 trees, not favorably located, but with good appliances, made 600 lbs. of sugar. One of his neighbors made 20 lbs. of sugar one season from one tree. From 62 trees tapped late in the season, two small boys, with a kettle on a crotch and pole to concentrate the sap to sirup, made 321 lbs. of sugar. One man made \$75 worth of sugar from trees that he planted for shade along the walls. Another man tapped a few trees left in the clearing near the house, and his wife made sugar and sirup enough for the family all the year. A letter from Hughesville, Pa., says: "Myself and brother, two boys, have made 400 lbs. of sugar, besides molasses, this season, carrying our wood and sap mostly without team, or any sugar-house, or any conveniences, and losing a good deal of sap, besides suffering the want of dry wood."

929. **Is Maple Sugar-Making Profitable?**—Manlius Engle, of West Almond, Alleghany County, New York, says he has been a sugar-maker all his life, and that the business is not only pleasant and health-invigorating, but profitable. He says: "The average from 200 trees during the past six seasons has been 1,300 pounds, and the net profits have averaged \$125 per season. During the season that has just closed, 3,200 pounds of hard caked sugar have been manufactured from 300 trees, and sold in Angelica at 12½ cents per pound. This gives \$400 as the gross proceeds of the season, from which deduct the following:

Two months' labor by self, at \$22 per month	\$44 00
One month's labor of yoke of oxen	18 00
Paid for cutting 24 cords of wood	12 00
Half the interest on 20 acres of land, at \$10 per acre	7 00
Interest and wear on sugar apparatus	9 90
For clarifiers, correctives, and incidental expenses	4 00
Total expense	\$94 90
Net profit	305 10

"The sugar orchard from which the above results were obtained is located on the summit of a ridge about 1,400 feet above Lake Ontario, and consists of 300 trees, mostly of large size, scattered over about twenty acres of ground, the soil of which is a deep yellow loam resting on a gray slate bottom. I boiled five kettles, and every twelve hours boil one kettle down to thin molasses, which is stored in barrels. I use milk and white of eggs, and a teaspoonful of saleratus in each kettle. From my experience, others may see what one man can do in the maple-sugar business. The reason why so many fail to make it remunerative is want of diligence and economy. There is no use for rifles, cards, dice, dominoes, novels, or rum bottles in a sugar camp. A tree should never be cut or bored more than two inches deep. Taking the average of years, 30 maple-trees will supply a family of six persons, and there are but few farmers that have not or might not have that number of trees without cost for land."

A sugar-maker of Monkton, Vt., gives the following results to show the profit of sugar-making in that section:

Dr. To 3¼ cords of 4 feet seasoned maple wood, at \$2 per cord	\$6 50
Labor—4 days preparing, tapping, cleaning up, and 16 days collecting, boiling, etc.	20 00
Interest on capital in boiling-house, tubs, and pans, at 10 per cent	6 00
Interest on 5 acres of land, at \$50 per acre (\$250), at 10 per cent	15 00
Total	\$47 50
Cr. By 800 lbs. of sugar (allowing 7 lbs. of sugar to each of the 3 gallons of molasses made), at 12½ cents per pound	\$100 00
Profit	\$52 50
At 6 cents per pound the receipts would be only	\$48 00

The above crop was made from 195 trees, the largest of 500 second-growth trees, such as were not used in 1856, tapped with a five-eighth-inch auger, and the sap boiled in four sheet-iron pans, 24 by 28 inches, 4 inches deep; one of which was, by way of experiment, covered, with very beneficial results."

930. **How Much will Maple-Trees Produce?**—The yield of the spring of 1858 in Vermont was estimated by one writer at a trifle less than three pounds per tree, which, he says, is the average of years, and that the yield of 1857 was extraordinary, and perhaps without precedent, being over five pounds per tree. A sugar orchard of 100 trees, belonging to Wm. Searls, Eaton County, Mich., yielded one spring 950 lbs. of sugar, at the rate of 9½ lbs. to a tree. In Vermont, thirteen sugar orchards (1,600 trees) in Randolph made 6,100 lbs. of sugar. Wm. Davis, of Pittsfield, made 1,000 lbs. from 153 trees. L. Carpenter, Rutland, made 1,000 lbs. from 160 trees. One sugar orchard that has been eighty years in use, tapped with a three-quarter auger, one spout to a tree, yields each 6 lbs. Another orchard, tapped with two or three spouts, yields but 3½ lbs. per tree, in consequence of injury from long time over-working. In Hancock, J. G. Robinson made 2,362 lbs. from 225 trees. A sugar place in Washington, Mass., containing 100 trees, owned by L. Johnson, produced one season 975 lbs. of clean, nice sugar, nearly one half of which sold for 16 and 18 cents per pound. The sugar was made by Mr. Arannah Mattoon, of Washington, aged 69 years. From a moderate-sized tree, standing in open ground in front of the residence of the Rev. David King, of Vernon, Trumbull County, Ohio, his wife made 34 lbs. of very fine sugar one season. It is thought if all the sap had been carefully saved it would have given 40 lbs.

931. **Ratio of Sugar to Sap.**—A letter before us gives the ratio of sugar to maple sap as follows: Sap concentrated 30 times makes what we call good sirup, and this sirup concentrated three eighths makes grained sugar, hard enough when taken out of a jar to require a stiff knife, which, as I calculate, is that sap concentrated 50 times in sugar.

1 quart water weighs............2 lbs. 2 oz.	1 quart sirup weighs............2 lbs. 8 oz.
1 quart sap weighs..............2 lbs. 1 oz.	1 quart sugar weighs...........2 lbs. 9 oz.

932. **Preparing Sugar for Market.**—Large quantities for the New York market are made in cakes. The size and shape of the cakes will often make a difference of one or two cents a pound. We advise all who intend to make sugar for sale, to provide a set of tin molds, so as to make well-proportioned, square-sided cakes, in parallelogram form, of exact, marked weights, from ten pounds—never larger—down to four ounces, or perhaps twelve and twenty-four cakes to the pound, for retailers to sell at one and two cents each. Sugar made as directed and cast in such cakes, and those packed nicely in boxes and sent to commission houses here, can always be sold at high prices, and when the maker becomes known, his sugar will be especially in demand.

One sugar-maker thinks it is not profitable to make cake sugar. He says:

"It is better not to make it into cakes at all, except for those that are near market or have an agent there, and then only in the first of the season, when it brings a high price. It is true that sugar made into cakes brings a higher price to the retailer, when sold by the cent's worth, as it often is, at the rate of twenty-five or thirty cents per pound, but the producer gets no more, nor as much, counting the extra work, to say nothing of the shrinkage there is in concentrating the sirup into sugar, as he would for drained sugar. By drained sugar, I do not mean this black, hard stuff which we sometimes see in market, but sugar as light as the best white Havana, and nearly as white as refined sugar, and which can be made without any filtering process by boiling in copper boilers and clarifying with milk and eggs.

"I have scarcely ever made a hundred pounds of sugar in any one season in any other way, and the result was I got from twelve to seventeen cents a pound, while my neighbors got but ten cents. But this is not all the loss in making it into cakes; every one knows that has had experience, that there is a loss in shrinkage of from three to five per cent. in the process of evaporating the water in the usual way, and the lower the sirup is concentrated, in the same proportion is the loss or shrinkage, so the difference is from one and a half to two per cent. in favor of strained sugar, while it is almost impossible to concentrate the sirup to dry-grained sugar without scorching or destroying its flavor. From actual experience I find the result as follows:

"Suppose 100 lbs. of sugar in the cake to be worth \$10, the same made into drained will give you 87 lbs. dry white sugar worth 12 cts., \$10 44; $1\frac{1}{2}$ gallons molasses worth 75 cts. per gallon, or $6\frac{1}{4}$ cts. per lb., \$1 $12\frac{1}{2}$; making a total of \$11 $56\frac{1}{2}$—showing \$1 $56\frac{1}{2}$ per hundred in favor of drained sugar."

933. **Plant Maple-Trees.**—It appears to us that we have said enough to induce reasonable men to plant maple-trees. If exposed, you can tap them above the reach of animals, and hang your buckets as we have directed, and the flow will be just as great as though tapped down at the roots. No tree can be planted with more certainty of profit than the sugar maple. Its form and foliage are beautiful; its shade delightful; its sap delicious and healthful in all stages, from the water that flows from the tree to its honey-like sirup on the hot buckwheat cakes; and its sweet products, if made as we have directed, will always be salably profitable. Maple sirup would outsell the very best golden sirup at any time in this city, if it were here for sale; and maple sugar is sold, tuns of it, every year in the confectioner's shops and in the street, to be eaten like candy, at 30 to 50 cents a pound. There will always be a market for any surplus that the country can produce, but that is not the grand object with us in urging its increased production. It is because it will greatly increase home happiness—the farmer's home. It is for that that we ask you to plant at least one maple-tree.

CHAPTER XI.

FORESTS AND FENCES.

SECTION LI.—TREES AND TREE PLANTING—WOOD OR COAL FOR FUEL.

AMERICA will soon be denuded of forests, unless we plant trees. Woodland in the oldest States is scarce and dear, and but for coal, fuel would be almost beyond the reach of the city poor. We should plant trees for timber, if not for fuel, and to improve the health of those regions naturally destitute of trees, for they are capable of changing arid wastes to fruitfulness. Stripping the land of wood has produced great changes within the short period since the Pilgrims landed. England is already planting trees. How long before America must follow her example? Let us consider.

934. **What Trees for a Plantation.**—To break the prevailing wind, there is no better tree than our common white oak, and none that looks more cheerful in winter. Its bleached leaves still adhering to the branches have a warm look and give an idea of shelter. Maples of all sorts are positively beautiful in green foliage, or after the leaves are variegated by autumn frosts. Black and white walnuts are both handsome and hardy, and produce fruit very agreeable to the children. Elms are good trees, and give us a pleasing impression of strength as their long limbs wave through the air. Chestnuts make a fine addition to a plantation, but their blossoms and burs are objectionable near the house. Hickory-trees should never be neglected in filling up a plantation; they can be transplanted by going the year before and cutting the tap-root. If you would attract birds to your lawn, you must plant cherry-trees here and there. In planting, let the rule be to put all small growing trees nearest the house, rising gradually to the highest in the back ground.

935. **Adaptation of Trees to Particular Locations.**—In all tree planting, *adaptation* should be kept prominently in view. The kind of tree best adapted to one situation would be the worst in another. The coniferous tribe—pines, firs, larch, spruce, hemlock, cedars—as a general thing, are best adapted to exposed situations and to barren sands. A sandy soil usually contains the food best adapted to trees like the pine. There is no part of the United States that does not produce several varieties and species of valuable and hardy conifera. But the tree which is most hardy and best adapted to

a particular locality is not necessarily indigenous to it. This is evidenced in the case of the ailanthus, a tree that grows vigorously in the crevices of rocks, or in drifting sands, or in the city pavements. Its growth upon New York island is unequaled by any other tree. Its roots are sometimes thirty feet in length, and it has a trunk and branches of corresponding size after it has been planted only a few years. It was brought here from the South Sea Islands, where it seems to be completely at home in dry banks of coral sand. This tree, not only because it grows so rapidly, but because it makes excellent fuel, and because it originated upon a sandy sea-coast, will probably prove one of the most valuable in the world for coast planting. If not so much so as the pine, it will doubtless serve well as a first growth, acting as a nurse to pines, larch, or cedar. Another rapidly growing foreign tree in all the Southern States is known as the China-tree, the wood of which makes excellent cabinet work. An objection to it as a street shade-tree is the abundant crop of berries, which no animal will eat. The objection to the ailanthus is the odor of its blossoms, which may be obviated by propagating with grafts from trees which bear pistillate flowers, as the odor only comes from the pollen of staminates.

Another hardy foreign tree is the paper mulberry, from China and Japan, where its inner bark is used for the manufacture of paper, and also for clothing. In the heat and dust of New York there is no tree that keeps so perfectly clean, fresh, and free from dirt, impurities, and insects as this.

In planting hills, mountains, or sloping sea-coasts, there is one rule that admits of few exceptions. Plant around the bottom first, and as planting at intervals of a few years is continued, and the summit is gradually approached, the lower and older trees act as a screen, and produce moisture and an amelioration of the atmosphere that are certain to serve as a protection to those on the highest and most exposed ground. Sometimes one sort only will be adapted to a given locality, but as a rule, there are several advantages in planting two or three species at once. It is not always possible to know which of several is best. Sometimes one species will grow fast, and will form a nurse for a slower-growing, longer-lived, and more valuable tree, which will remain after the first has disappeared.

For house surroundings, which add greatly to the beauty, comfort, and health of a place, and for roadside planting, we will give the names of a few hardy trees.

936. **Descriptive List of Hardy Trees.**—NORWAY MAPLE.—This is one of the finest of all deciduous shade-trees. A round-headed, densely-leaved, vigorous and healthy tree, with deep green foliage, one of the first to come in leaf in the spring, and among the last to drop in autumn, succeeded after a frost by hues of the most beautiful colors. It is far superior to the popular silver maple, which affords by no means so dense a shade, and which is liable to breakage of limbs in every high wind. To make a good shade-tree of the silver maple, in the country, it should have a rich soil, inclined to moisture, and be liberally headed back.

Sugar Maple (*Acer saccharinum*).—One of the chief beauties of this tree is in the very graceful appearance it presents with its straight, slim trunk, when surmounted by its dense and regularly formed head of green. Rather slow in growth, late in putting out, in autumn foliage deep orange and red.

Swamp Maple.—A native, and a very pretty tree on a lawn with its scarlet flowers and fruit, but liable to persistent attacks of the borer.

The Ashes are not general favorites. They are late in putting forth, among the first to drop their leaves, and liable to the borer.

Black Walnut (*Juglans nigra*) is worthy of a place in the farmer's yard, both for shade and fruit.

Paulonia Imperialis, of Japan. A few years since a rare tree, and one which has been greatly over-estimated. It is a rapid grower, closely allied in habit and appearance to the catalpa, but becomes a much larger tree. Has a large leaf, with a light blue flower of a peculiarly disagreeable odor, but which perfumers use. Like the catalpa, it is late in putting out, and among the first to drop its leaves; accumulates much litter during the season, has an ugly seed pod which hangs on the whole year, and withal presents during half the year a bare-armed, desolate appearance.

Sassafras (*Laurus sassafras*).—One of the prettiest of our small native or foreign trees. The suckers which it is liable to throw up, and which have caused most persons to object to it as a lawn tree, are easily kept down.

Honey Locust (*Gleditschia triacanthus*).—A tree of most rapid growth, but with thin foliage, and therefore a poor shade-tree, and very liable to attacks of the borer—throws up a great many suckers, and is apt to lose its limbs in a high wind.

Tulip Poplar (*Liriodendron tulipifera*).—Slow of growth and difficult to transplant, but one of the noblest of our many noble-looking American trees. In planting trees, a common error we make is to plant them too near the house, or walk, or road, or fence, forgetting to allow for the growth of the tree in after-years.

Evergreens.—The Norway spruce (*Abies excelsa*) is one of the most healthy, rapid growing, and handsome trees, and never much out of place wherever planted.

The Scotch Pine or Fir (*Pinus sylvestris*).—A rapidly growing, rather coarse-looking tree, but of a very fine dark hue after passing its youthful days. It is liable to lose some of its limbs after a heavy sleet or snow. Being of coarse habit, it looks best at a distance from the house or road.

Silver Fir.—A fine ornamental tree with its horizontal limbs and bright silvery foliage.

Balsam Fir.—Very handsome in its youth, but with age, in exposed places, loses its beauty.

Hemlock Spruce.—Perhaps the most beautiful and graceful of all evergreens, but not as great a favorite as the Norway spruce.

The Chestnut (*Castanea*) is one of the most valuable trees that we know of, and it is easily grown from seeds. If they are packed in sand as soon as mature, they may be transported a long distance, and should be planted in pots or seed beds.

THE YELLOW LOCUST (*Robinia pseudacacia*) is a very valuable timber tree, which can be grown from the seeds, no matter how old they are, if scalded in boiling lye.

LINDEN, OR BASSWOOD (*Tilia Americana*), is a beautiful but neglected tree. The large leaves on its branches make it an agreeable shade in summer, and in the spring its profusion of blossoms, so grateful to the bees, make it a desirable tree to plant around dwellings and pleasure-grounds.

937. **What Has Been Done in Planting Forest Trees.**—Amos Otis, of Yarmouth, Mass., is an extensive and successful planter of pine-trees, and he gives the following valuable information upon the subject. He says: "I commenced planting the pitch pine in 1832, as an experiment, and have since planted 200 acres. The growth is very slow at first, but after the third year the average annual increase in hight is about one foot. I have some lots that have averaged a foot and a half upon land that had been worn out by repeated crops without manure. A sandy, or a sandy loam soil—one that is too poor to sward over thickly with grass—is best. Lands that produce no vegetation are unfit. The young trees at first require some protection, and will not succeed in a loose, barren sand. March is the best month for planting. I have a machine with which a man and a horse can plant six acres a day. It plows a small furrow, drops and covers the seed, at once passing along.

"Those wishing to plant pine seed can take a plow and make parallel furrows about six feet apart, and with a machine, used for planting beets or onions, run along in the bottom of the furrows, dropping three or four seeds in a place and about a foot apart, covering them not more than half an inch. If all the seeds vegetate, there will be ten times as many trees as can grow on the land; but they will die out in the course of a dozen years. When I was short of seed, I put the rows eight or ten feet apart, and dropped the seed about three feet apart in the rows. I have paid from $1 to $2 per acre for the land, and the seed and planting have cost me about the same sum per acre. Adding interest, I have about doubled the money invested. It is a small business, I confess; but the world is made up of small affairs.

"When I commenced planting, my neighbors laughed at me, but now they are all planting their old fields. At Middleborough the farmers are planting their worn-out soils with the white pine, which is of very rapid growth. When planting with my machine, I rub off the wings and clean the seed. If you plant yours by hand, you should not rub off the wings."

The pine extensively planted on the sea shores of France and Italy is the *Pinus maritima*. There are two other species: the *Pinus larico*, or Corsican pine; and the *Pinus Calabriensis*, or Calabrian pine, which is also a lofty and beautiful tree, with wide-spreading branches and long foliage, and both these species are vigorous, very hardy, and of quick growth.

The French Government has planted immense forests of the American cypress (*Taxodium distichum*), obtaining the seeds from this country.

In Germany, American pines and other American forest trees were planted, many years since, and immense quantities of their seeds are furnished thence, to supply all Europe. Holland has spent many thousands of dollars in importations of seeds from this country.

938. **Why and When to Plant Trees.**—Now is the time, no matter when you read this article, now is the time to begin to plant the seed, buy the trees, cut the grafts, put in the buds, prune the branches, prepare the ground, dig the holes, or do something connected with the business of planting, transplanting, or growing trees.

If no more, plant one tree—only one; it is all we ask; it is a small job, a mere trifle of labor for an idle moment; a moment that may be spent in worse than idle occupation; a moment that if spent in planting a tree, might be the means of raising a monument to your name, or a monument to mark a point of history in the country, like that of the Charter Oak, so renowned, so honored in the history of Connecticut. True, that was planted by One who needs no monument, yet has them by the million; One whom we should imitate; One whom we may honor by the work of our hands, for with them we can build a home for the birds and a shade from burning suns for beasts, besides gratifying the eye of man with new beauties—the beauty of trees with green leaves and flowers and fruit. Therefore we want every hand in which the warm blood of manly life flows to plant a tree—one tree. Not while the ice and snow hold dominion all over our Northern region, but while there is time to think, to promise, to determine, to begin to warm into life yourself, or else you never will come to the point of bringing into life one tree. While you sit around your warm winter fires, which you would not have without the products of trees, while you look out upon the almost treeless landscape; while, if you live in towns, you see a hundred brick houses where you see one tree; while, if you live in the country, you see mile after mile of lanes, and remember that last summer there was not a single shade in all that distance; and while, too, you read of the scarcity and high price of fruit, think how many more trees you might grow if they were once planted. We conjure you to resolve now, to-day, this moment, that when the ice melts and the ground softens, and the spring birds begin to sing, that you will plant a tree—one more tree; either for fruit, or shade, or ornament; and let it grow free shade, free flowers, free fruit, in a free soil, and let it be the Tree of Freedom. Do not restrict the planting to the head of the family, but let every man, woman, and child plant a tree—a tree to mark the date of the passing year. Think of it; do not let the year pass without adding one more to our cultivated trees—one more monument to remind you of fleeting time; one more guide-mark by the roadside of life, that may in future years give you new aspirations of love for a free country, and for a people who planted trees.

Plant them by the roadside—plant them in yards, streets, lanes, lots—

wherever you can find room for a tree to give shade or bear fruit. There is no better time than November to plant hardy fruit-trees, and every hundred dollars that may be spent in planting such trees along the highway of a farm that has a public traveled road running through it will add a thousand dollars to the selling price of that farm twenty years hence. Take up large trees with plenty of roots, and plant them as though you intended them to grow, and they will grow. The public seem to need to be constantly reminded that trees will not grow where they are wanted unless they are first planted. All love fruit—all love shade—everybody admires flowers and green foliage, and even bare branches in winter are beautiful, yet how few lay the foundation of after-years of enjoyment by planting trees, shrubs, vines, for fruit, flowers, or shade! For shade-trees, the maple, elm, oak, walnut, butternut, hickory, locust, sycamore, willow, pine, cedar, fir, American tulip-tree, silver-leafed poplar, for the Northern States; adding the holly, magnolia, live oak, and orange at the South. Remember, too, that cherry and apple trees make magnificent shade-trees, and that so far as possible in setting roadside and pasture shade-trees, either those which bear fruit or nuts should always be preferred. And lastly, remember that nothing adds more to the value of a place than trees, and nothing gives beauty to a country equal to shaded roads.

939. **How to Plant Trees.**—This is the way. Whether for fruit or shade, prepare your ground well before you attempt to put a tree in its place. Always dig your holes deep and wide, and no matter if the work is done a year before you want to use them. A little freshening with the spade and some loose soil in the bottom will be found by experience just what your tree wants to make it grow. Make it a rule never to injure a single root that you can save in taking a tree out of the ground for the purpose of transplanting, and never buy a tree that has been taken up without some regard to the importance of having plenty of roots and a moderate amount of top branches.

Some trees and shrubs, such as the willow, sycamore, or currant, will grow from a mere stick cut from a top branch and stuck in the ground, while a hickory, or oak, or long-leaf pine can only be transplanted by first cutting the long tap-root while it is growing, and then letting it stand long enough to form new short roots, which must all be moved with the tree, with as much soil as possible adhering; or by what is termed a ball of earth secured to the roots by freezing or mechanical means.

If your ground is stony, lay a floor of stone around your tree; if not, cover up the surface with straw, old hay, or leaves, or small bushes. This is called mulching, and is one of the most useful things you can do to promote the growth of your trees.

In planting an orchard, the whole tract should be deeply plowed and manured as a preliminary step. Land is seldom too rich for young trees. Ten per cent. of the nursery trees die from bad packing and being long out of the ground, and a vast number are killed by that stupid practice of trimming off all the roots and branches. If your soil is thin, make it deep by plowing and digging deep holes and carting rich earth to fill them. If your soil is stiff clay, change its character before you try to grow trees in it. If your soil is wet, you may grow swamp elms and maples, or water willows, or sycamore-trees, but it is labor lost to try to grow fruit-trees, for they will not live in water. Nothing tends more to the growth of young trees than underdraining; and if the tiles are placed five feet deep, as they always should be, there is but little danger of their being closed soon by the roots. Trees in their growth should be fed with pabulum for the formation of wood and fruit. There is nothing better than potash; even coal ashes are beneficial. Any kind of decaying wood will give food to growing trees. The pruned branches of a tree should never be carried off the land. Pile them and let them rot, or spread them around the tree. Water your young trees every night in a drouth. If possible, wet the tops as well as the roots. The earth should always be wet when the trees are planted. Mulching serves to keep them moist. Trees that are transplanted with such tops as all trees should always have, must be supported by stakes to insure speedy growth.

940. **Where to Plant Trees.**—There are so few situations where a tree may not be planted, that it appears almost unnecessary to discuss the subject as to where it should be planted; but there is one position upon every farm which, more than any other, will pay for tree planting. This is by the roadside. If it is a public road, so much the better; it will pay upon any of the farm roads. We have never seen a tree-lined highway through a farm without being impressed with the idea that its value was enhanced much more than the cost of the labor of planting. We have a vivid recollection of one of this kind, in the farm owned by John Jay, in Westchester Co., N. Y., the roads through which are lined by noble elms, planted by his grandfather, whose name is famous in American history. Let us add our mite of honor in recording the fact that a great and good man planted trees by the roadside. Let all boys, who would emulate so good a man as John Jay in all his life, follow his example and plant trees by the roadside. Do not listen to the selfish proposition that some land owners urge against planting trees along the road, that it shades and injures the crops. It is only so to a limited extent, where hoed crops are cultivated. If the shade is objectionable on one side of the road, it would not be so on the other. Besides the highway and farm roads, where trees may be planted, there are always nooks and corners about a farm that would support a few trees, all of which would add to its value, for they would add to its beauty; and it is that which makes a farm salable.

So we entreat you to teach your children to plant trees. Among other things, teach them their common and scientific names.

941. **Transplanting Evergreens in the Summer.**—One writer says: "In the very hot weather of July, 1856, I set to work ten men to remove old evergreens, viz., yews, junipers, arbutus, laurestines, and Portugal and common laurels from four to ten feet high. I made a hole first, not deep,

but sufficiently wide to allow all the roots to be laid out straight. In the removal I cared but little for the ball of earth, but aimed to get all the small roots possible. In its new home, cover the roots with fine soil, and tread a little to make the plant stand upright. Then fill up the hole with water, and fill in the soil around the hole carefully as the water sinks away. Next day tread the soil somewhat firmly, after which make a ridge all round the edge of the hole, in order, as it were, to form a dish; fill this with water three times during three successive days, then level the ridge down, covering the mud over with soil. After this no more water is required at the roots; if the weather be dry, syringe the shrubs overhead three or four evenings. Young laurels are treated the same as the large shrubs, except that they get no syringing. In my opinion the months of July and August are the very best for removing valuable large evergreens. Treated carefully as above they are sure to grow, and they get hold of the soil immediately, for the earth is like a hot-bed, into which the young roots soon enter."

Another one says: "The best time to transplant evergreens is when the tree begins to push its cones, or a little after. From the middle of April to June, in this latitude, is a good period. A calm, warm, cloudy day should be chosen for transplanting. The roots of an evergreen should never be allowed to get dry, or become chilled when taken up. It is the exposure of the roots to such influences that kills so many of these trees. Care also should be taken to save all the roots. They are more injured by cutting the roots than other trees."

942. **Buried Seed of Antediluvian Trees.**—The following statement of facts made by the late Judge Burnett, of Ohio, in his "Notes on the Northwest Territory," says: "In the year 1802, a well was dug at Cincinnati, within the central Indian circle, in which, at the depth of 93 feet, two stumps were found, one about a foot and the other about eighteen inches in diameter, standing in the position in which they grew. Their roots were yet sound, and extended from them horizontally and regularly in every direction. The surface of the earth over the place where they were found was 112 feet above the present low-water mark of the Ohio River. They must have grown on the spot where they were found. There is another fact connected with this subject worthy of notice. Before the well was dug, not a mulberry-tree had been growing on the premises, though they were found in the neighboring forest; yet the next season they sprang up wherever the excavated earth had been spread, in such numbers as made it necessary to destroy them, and they continued thus to shoot up for a year or two, though not one made its appearance on the remote parts of the lot, to which the excavated earth had not been carried. This fact produced the belief that one of them must have been the stump of a mulberry."

943. **The Age of Trees.**—The age of trees is a marvelous and interesting study. While there are some species that pass quickly away, others live to generations that knew not their planting. The elm has been known to live 350 years; the chestnut, 600; the cedar, 800; the oak from 1,000 to 1,500;

the yew, 3,200, and the California giants are estimated from 3,000 to 5,000 years. The Charter Oak at Hartford, Ct., by estimate, was 945 years old, measuring nine feet across four feet from the ground. If we take this as a fair sample of the growth of oaks, a tree should be about fifteen feet in circumference to be five hundred years old.

"The Rhodes' Oak," in Stonington, Ct., measures about 21 feet in circumference, and has an age according to the Charter Oak standard, of 735 years. All over the country there are other "remarkable old trees."

In the city of New York there is one known as the Stuyvesant pear-tree. It was so venerable when the farm, where it was planted, was laid out into lots and streets, that the corporation inclosed it with an iron fence, and it is now, October, 1862, still alive, and three years ago it bore fruit, at which time the tree was supposed to be fully 210 years old. It stands at the corner of Third Avenue and Thirteenth Street.

944. **Value of Trees in Cities.**—An eminent London physician expresses it as his opinion, that if all the trees and shrubs were removed from the two or three thousand acres of parks, and from the gardens and private grounds of the great metropolis, in one year the bills of mortality would show an increase of deaths to the extent of more than fifty per cent. If we consider that there are ordinarily in London over 1,000 deaths a week, or nearly 60,000 a year, that the deaths by cholera in 1849, during the worst period of the visitation, were at no time over 5,000 a week, we see the bearing and influence of trees—according to the opinion quoted—on the health and longevity of the inhabitants of a crowded city. We might as reasonably expect that land animals could live without air, or fish without water, as that there could be a pure and healthy atmosphere where there are few or no trees or rapidly growing plants, or where, in an extended region, animal life vastly preponderates over vegetable life. "The winters of Salem (Mass.), instead of having been rendered more mild, as conjectured, from the eradication of the forests, have become colder by 6° Fahr., during the last thirty-three years."

945. **Growing Trees from Seeds—Oaks, Evergreens, Locust, Hickory.**—There are now growing in England several very fine plantations of oaks, from acorns planted either by the present owners or their fathers.

There is a noted instance in South Carolina, of successful tree planting, by Micajah Buchanan, early in this century. One who visited the place in 1860 thus speaks of it: "There was a lot of six acres of this new forest upon which oaks, pines, hickories, and dogwoods were growing. The pines measured two feet in diameter; fine specimens being free from limbs, and of beautiful and thrifty appearance. Several of the oaks measured twenty-two and twenty-three inches in diameter, and from sixty to seventy feet in hight, smooth and thrifty in growth. Only seed of oaks was planted; the other kinds were self-seeded from the adjoining forest. The success of this experiment in growing trees shows how easily they may be reinstated whenever it is desirable. But we must not leave nature to do what it is our duty to do for ourselves. We should gather the seeds, and prepare the soil for their reception. The soil for a tree nursery should be as good and well worked as a well-cultivated kitchen garden. The proper way to plant small seeds of forest trees is to pulverize the soil well, and roll it, and then sow the seeds and cover lightly with leaf mold. Great care is required to grow forest trees with success. Care must be taken in selecting soils. No wet soil, nor a ferruginous one, should be chosen. The young trees, too, must be carefully guarded against the depredations of cattle, as all farm stock are fond of young shoots of most forest trees. Sheltered situations should also be selected for the nurseries. Belts of sheltering trees should always be planted in all open places, like the Western prairies. The trees for these belts may be grown from seed, in advance, or purchased, or in some cases brought from their native localities in the forest.

Hickory seeds and those of similar trees should be sown in autumn, in drills twelve or fourteen inches apart, and thick in the row, to be thinned out as the trees grow. Squirrels are great pests to the nurseryman, and much care is necessary to guard against their depredations. Manure, and particularly that made of leaves, is valuable for tree nurseries. So are ashes. Weeds must be exterminated, or they will destroy the young trees.

The larch is recommended as a good nurse for other trees, as it grows rapidly in almost any soil. Do not plant on a retentive soil in wet weather. It is almost as necessary to keep a new plantation clean for two or three years as it is to keep the nursery clean.

Locust seed is difficult to vegetate, owing to the very hard shell which encases the meat. If it is gathered in autumn and mixed with sand, and kept moist, exposed to the weather till spring, it will grow; or if it is soaked several days in hot water just before planting, it will grow. Instead of using hot water, you may use boiling hot lye, and plant the seed at once, and it will vegetate and grow immediately.

Evergreen seeds may be treated as follows: Keep the seeds of arbor vitæ dry and cool till spring, and then plant in fine leaf mold in a shady place. Norway spruce seed, and pine, hemlock, and juniper, should be kept in boxes of sand as it comes from the bank, in a cellar, and next spring plant in shady or half shady spots. If planted in sunny situations, the young plants are apt to perish. If there is no other shade, erect an awning. The juniper family do not vegetate the first year. The common red cedar seed may be made to grow by scalding.

The *mulberry*, which is also rapidly multiplied from seed, was first grown in England in the reign of James I.

The *white larch*, now very abundant, was accidentally taken to Scotland in 1737. Mr. Menzies, of Culdare, having procured four of these plants from Siberia, gave two to the Duke of Athol, which are still in full vigor at Dunkeld, and may be called the parents of all the larch-trees in the kingdom.

The *plum-tree* was brought from Asia in 1580. The *cockspur hawthorn* in 1692. The *maple-leaved hawthorn* was introduced into England from America in the year 1783. A beautiful variety of the *alder* was first cultivated in the year 1780, being brought from Switzerland, Siberia, and other cold countries, and the *cedar* in 1664. Now look at all of these trees in England—how extensively they have spread! "Why," said one to an old man who was planting acorns, "why do you plant things that never can benefit you?" "Because I wish to leave the world better than I found it. If others had not planted trees, I should not have enjoyed their delightful and agreeable shade. I plant trees, that others may have the same pleasures, and sit beneath their outstretching and shady branches. The man who only lives for himself and his lifetime without adding his mite to human enjoyment, is worse than the veriest miser; the one leaves his riches, the other nothing but his bones—and those dry and withered."

Is that not a sufficient incentive to every good man to plant trees—at least one acorn?

946. **How Seeds are Diffused.**—Many seeds are supplied with a feathery arrangement, which enables them to rise in the atmosphere and diffuse themselves over creation. This is the case with some of the forest trees, the seeds of which waft upon the wind many miles. Others are water-proof, and float away upon the water. But what if all seeds should grow? Our farms, with all our care, would become a wilderness.

947. **A Rare Ornamental and Valuable Medicinal Tree.**—Rare only because it is rarely used for ornamental purposes; yet it is uncommonly beautiful, of rapid growth, and hardy, and easy to transplant from its native woods, where it abounds in all the States south of latitude 41°. This tree is familiarly known as the Sweet Gum—an accidental name given to distinguish it from the Sour or Black Gum (*tupelo*), which is also known in the New England States by the name of Pepperidge. The scientific name of the Sweet Gum is Liquid Ambar. Both names are appropriate enough. The tree exudes a white wax, odoriferous and soft, which hardens and grows dark, somewhat like amber, by exposure to the air. The tree is one of the very cleanest, so far as regards insects, and its effects upon the earth or air where it flourishes most abundantly, with the exception of covering the ground with its curious fruit, which is about the size of medium "button-balls," the fruit of the sycamore (*Planus occidentalis*). These balls are full of honey-like cells that contain the seeds, which may be planted like those of the pine family.

Michaux, the author of that great work the "North American Sylva," spoke of this tree as far north as Portsmouth, N. H., but we have rarely seen it north of the city of New York, where some native trees are in Jones' Wood; it is quite abundant in New Jersey, and especially so in all the cotton-growing States. It abounds also in Kentucky, Ohio, Indiana, and Southern Illinois. It is held in very low repute as a timber tree for the farmer's use, though it would make good boards for many purposes.

It is for shade and ornament alone that we call attention to it, and in that respect it is deserving of special notice. It is also of great value as a medicinal tree. It is esteemed where best known as an infallible specific for all complaints of the nature of diarrhea, for the treatment of which a tea is made of the bark. From what we personally know of its value in such cases, we can not speak too highly of it.

Hovey, in speaking of this tree, and recommending it, in his magazine, says: "The sweet gum forms a large tree, having somewhat the appearance of a maple, from thirty to fifty feet high, according to the soil and latitude in which it grows; the trunk is straight, nearly uniform in thickness, to the hight of twenty feet or more, where its branches begin to diverge. The bark of the trees while young is nearly smooth; but as they acquire size and age it becomes thick and deeply furrowed, the secondary branches being covered with a dry, flaky bark, the plates of which are attached at the edge and not on the face, as in other trees. The leaves are smooth and of a yellowish green, varying in size from three inches to six inches in diameter, and they are palmate, that is, they are divided into four deeply cut lobes, resembling in shape a star. The male and female flowers appear on the same tree, the former being rather inconspicuous, while the latter are oval catkins one and a half inches long. These appear in March or April, and are succeeded by a globular fruit, bristling with points, and containing one or two small, blackish, perfect seeds. The leaves change to a deep red, or almost an orange scarlet, immediately after the first frosts, and keep their brilliant color for some time. As the tree is so extensively distributed, so it is found in all varieties of soil, from the dry and gravelly hights of the North to the deep river bottoms of the South and West. On the unpropitious soils it usually does not grow more than twenty or thirty feet high, but in favorable localities it attains its amplest dimensions. Michaux measured a tree which he found growing in a swamp in Augusta, Ga., that was fifteen feet in circumference, with a summit in proportion to the size of the trunk."

The shape of the leaves is much like that of the maple, and the tree is equally hardy and valuable for a shade-tree. When planted in open ground it branches low and forms a spreading top. In England, where it has been introduced as a rare foreign tree, it is much admired. If better known, we think it would be popular here. It might, at least in part, take the place of the omnipresent ailanthus.

948. **The Elder—its Virtue.**—It is free of insects, and ornamental. It was stated in England, more than sixty years since, that no insect or worm ever harbors upon the common elder (*Sambucus*), and that it is a protection to all other plants when grown among them. It is stated also that elder leaves scattered upon insect-infested plants will tend to drive away the pests.

As a well-trained elder, grown like a tree, is really an ornamental shrub, why not try to grow plums in juxtaposition with the elders? If the plums failed, you would have the elderberries, which make better wine than most of the small fruits used for that purpose.

949. **The Sumac.**—We perfectly agree with Wilson Flagg, in an article in *Hovey's Magazine*, that sumacs are, among our New England scenery, some of its finest ornaments. The foliage is beautiful in summer, and then come

its bright crimson cones and green leaves; then its rich crimson tints in autumn, and lastly, the spikes of red berries, that remain after all the high-colored leaves have blown away. There are several varieties of sumac in this country. Mr. Flagg says of that called "Staghorn" (*Rhus typhina*): "This shrub rises to the dignity of a tree in favorable situations." Yes, to a dignity, in Mississippi, of a tree that is used for common split fence-rails, at least two ten-feet cuts to a tree. Of another variety, the *Rhus radicans*, Mr. Flagg says: "Its habits are very similar to those of the Virginia creeper (*Ampelopsis*), though it seems to have more tenacity, and to fasten itself more permanently to the objects it embraces. It seems to be almost parasitic in its habits; though I believe a branch will not survive the severing of the connection between it and the root. The numerous radicles with which it penetrates the surface of trees and fences, seem adapted only to support, not to nourish, the plant. I regard this as one of the most beautiful woody vines among our indigenous plants. Some may be inclined to give their preference to the creeper; but the foliage of the creeper is not so elegant, nor does it invest the object on which it clambers with so close and compact a mass of foliage. It would hardly be advisable, however, to encourage its growth, on account of the liability of many persons to be injuriously affected by contact with it, though it possesses these noxious properties in a less degree than the poisonous dogwood. The leaves are in threes, and by this arrangement are readily distinguished from those of the creeper, which are in fives. So small is the danger from this plant, that I should never advise one to destroy it in a favorable spot, when the different objects were festooned with its beautiful green foliage."

This is the plant commonly known as poison ivy, that is so frequently to be found enshrouding an ugly old wall, and giving it the appearance of a live hedge. Its poisonous qualities are not very objectionable. As an ornamental plant, it is valuable. See where it hides old walls, stumps, and dead trees, making them look alive again. See how it may be used to train over hedges or blank walls of buildings, or cover the boles of tall trees. It is a plant to be used, not despised nor eradicated.

950. **The Hazel.**—Of all other common bushes—so common as to attract little notice—the hazel (*Corylus Americana*) is the most neglected shrub, while one of the most worthy of cultivation. Such a modest little bush, too, willing to accept as its share of earth's surface the corners of zigzag fences, or sides of stone walls, or little nooks about the rocks where the plow can not reach. Sometimes the woodland edges are still further bordered out with hazel, sometimes growing boldly out into grass or up to the corn-rows, and sometimes tapering down from the tallest bushes to mere little timid twigs. This is the bordering of many of the prairie groves; and often we find far out in the sea of grass a solitary oak, surrounded with a flourishing plantation of hazels, invariably standing as a living declaration to the home-seeking emigrant, that here he will find a rich, loamy soil, for in such the American hazel flourishes, and in suitable soil it is found in all the Northern

and Middle States. Instead of despising and trying to eradicate this pretty little shrub, we would extend its growth by cultivation. As a border of lawn walks, or for a separation of plats, where a high screen is not required, it is the best that we know; for it is a clean-growing one, and can be kept, by cutting out the old wood, continually sending up its new, straight shoots; and then it is one of the first in spring to put forth its beauties; and what more pleasing sight than its fruit-loaded branches, except it is the squirrels and children that are equally attracted to gather its sweet nuts. We really wish that every unsightly fence or stone wall along the country roads were, as some of them in New England are, hidden with hazel bushes. It need not be said that such thickets would harbor the birds; it is just one of the purposes we wish to promote.

951. **To Prevent Forked Trees Splitting.**—J. T. Moxley, Sheboygan County, Wis., recommends to twist or wind together a few of the smaller limbs above the fork, which will grow in that position as the tree increases in size, and form a natural brace. He states that he has treated many trees successfully in this manner. We have prevented forked trees inclined to split, and even secured those that had already commenced to part, by boring through with an inch auger and driving in a strong wooden pin. A small iron bolt, with a head on one end and a nut on the other end, is even better. The new growth will soon cover the pin or bolt.

952. **Timber Made Durable.**—We have often seen it stated, that timber to be used for ax-helves, flails, mallets, ox-bows, axles, etc., in Germany, is soaked several days in a strong solution of stable manure, and then smoke-dried, which greatly toughens and adds to its durability. As the process is so simple, we advise every one to try it for himself.

953. **Use and Value of Basswood Bark.**—The linden (*Tilia Americana*), which is more known under the name of basswood-tree, is a valuable as well as beautiful tree—beautiful as an ornamental tree, and valuable for timber, and its bark, out of which bass matting is made. This article is imported and used extensively in place of our native stock, we suppose, because people do not generally know how easy it is to prepare the bark for use. It is simply to take the whole bark as it peels from the trees when the sap flows freely, say about June in this latitude, and sink it under water until the liber (inner bark) will peel and separate easily from the coarse bark. This soft, tough substance is then dried and stored away for future use, and the purposes to which it can be applied are almost numberless.

954. **Value of the Ailanthus in Sandy Wastes.**—This tree is good both for fuel and timber, and one of the most rapidly grown in the Northern States, and it has been demonstrated that the most sandy wastes can be re-clothed with trees by planting the ailanthus. Upon a bare, sandy plain, where neither trees nor grass now grow, we are confident that ailanthus-trees may be planted, with only a wheel-barrow load of rich loam to a tree, and that in ten years the growth would not only be such that it would hide the desolate barrenness of the land, but would make it of a salable value.

955. **The Economy of Fuel—Wood vs. Coal.**—The following table shows the relative value of different kinds of wood for fuel:

Shellbark Hickory	100	Yellow Oak	60
Pig-nut Hickory	95	Hard Maple	59
White Oak	84	White Elm	58
White Ash	77	Red Cedar	56
Dogwood	75	Wild Cherry	55
Scrub Oak	73	Yellow Pine	54
White Hazel	72	Chestnut	52
Apple Tree	70	Yellow Poplar	52
Red Oak	69	Butternut	51
White Beech	65	White Birch	43
Black Walnut	65	White Pine	40
Black Birch	62		

Although all trees of the nature of hickory, the fibers of which are densely packed, giving great solidity and weight, compared with pine or other light woods, are the most valuable for fuel, there is a great difference in the value of wood of the same variety, owing to its manner of growth and nature of soil where it grew. Trees which grow in forests or in rich wet grounds are less consolidated than such as stand in open fields, or grow slowly upon dry, barren soils. There are two stages in the burning of wood—in the first, heat comes chiefly from flame; in the second, from red hot-coals. Soft woods are much more active in the first stage than hard, and hard woods more active in the second stage than soft. The soft woods burn with a voluminous flame and leave but little coal, while the hard woods produce less flame and yield a larger mass of coal.

The purpose, however, for which it is needed, must be considered. A thorough white pine, compared to hickory, is only as 40 to 100 for heat. If a quick fire be needed for immediate warmth, or kindling for coal or other wood, the pine is most suitable. For kindling coal fires, we have always found a mixture of hard and soft wood good economy.

Speaking of coal, is it economy for a farmer to burn it? It is a question worthy of consideration. It is one that we have already considered, and it has made us wonder at the error of some old farmers in the vicinity of tide-water and railroads, where coal can be had at a low rate, compared with the selling value of wood. They stick to the old-time fashion of days when wood was the only fuel, and maintain wood lots upon land worth \$200 or \$300 an acre, to furnish their annual supplies of back logs and fore sticks, with as much pertinacity as though their lives depended upon nothing but a sufficiency of firewood. Do such men ever think of relative value? Probably not. Let us show them what we think.

A tun of anthracite coal (2,240 pounds) measures 28 bushels. Its average cost at tide-water may be taken at \$5 a tun, and hickory wood at \$8 a cord. The coal is fully equal to two cords of wood of the best quality, and we do not know how many cords of such wood as we often find for sale, or such as farmers use, which they could sell at \$4 or \$5 a cord. No man in the vicinity of New York can afford to keep woodland or burn wood as a common fuel. Prof. Mapes contends that a man can not afford to keep arable land in the vicinity of this city, or any other high-priced locality, in apple-trees, much less in forest trees, except just so far as may be agreeable for shade and ornament—certainly not for the purpose of growing fuel. No man can afford to hire men to cut and haul wood, and prepare it for the stove or fire-place, if it had no other value, where coal is not more than \$6 or \$8 a tun.

The most of the farmers in the forest-denuded portions of the country have to haul their fuel, on an average, one mile; and if it is valueless where it is growing, it will be worth at home, when cut and piled under cover, at least \$2 a cord; and in many cases counting the value at which it could be sold in the forest, and actual cost of labor, it will be worth \$3 to \$5 a cord, fitted for the stove. Now if good anthracite, or bituminous coal can be delivered, as it often is to the farmers twenty or thirty miles around New York, at \$6 a tun, a farmer can not afford to burn his own wood, because coal will cost the least money. Wherever woodland is valuable, cattle should be fenced out, and paths located so as to drive through without destroying young trees, and proper care exercised in cutting fuel or timber trees.

As to giving up the old worm-fence, there is no hope of that as long as there are ten trees to an acre; but certainly we can economize by having fewer divisions, fewer fences, and straighter worms. And we can economize in other ways—we can cut our timber at the season when it will be found most durable, and we can select timber the least valuable for fencing, and leave the best for more important uses. It is not only necessary for farmers to study economy in fuel, as to what shall be used, but if it is to be wood, then practice economy in growing and preserving a suitable supply.

956. **How Should Fuel be Seasoned?**—The almost universal way of piling wood is not the best way to season it. Some kinds, if laid upon the ground at the bottom of a pile, will never season—they will rot. That is the case with cottonwood upon the Mississippi bottoms. Everywhere the bottom sticks of a pile are less valuable than the top ones. For this there is a remedy. Take nature for a guide and set our fuel on end, when we desire it to season.

The following plan is an excellent one to season fuel or to store it, as railways sometimes do, to keep several years: Commence with medium-sized sticks set two and two along in a row, leaning together, spread wide enough apart at the lower ends for a good-sized dog to run between them. Continue to lean up sticks outside until the rick is five or six feet wide, with the top ends always down. Now lay on the top a few sticks lengthwise to form a ridge, and then commence to shingle your pile with split wood, with which you can easily form a roof almost water-tight enough to prevent any rain from wetting the pile below. There is no position in which fuel will season quicker or keep better, remaining sound and dry, and actually increasing in value, instead of constantly deteriorating as it does in cord-wood piles.

Do not continue the old way with no better argument for it than this: "It is the way my father did, and he says his father always did so; and I guess if it was not right they would have found it out."

This declaration is the end of all argument. It is a bold son that dares to do as his father and his father's father never did. Yet, in this matter of seasoning fuel, he should have courage and shake off the shackles of precedent, and get out of the old hard path of our very respectable (in their time) old-fashioned grandfathers.

957. **We Should Plant Trees to Grow Fuel.**—Wherever land is sparsely wooded, farmers should plant trees for fuel as certainly as corn for bread. The most rapid growing trees should be selected, such as ailanthus, locust, sycamore, and chestnut. Peach, we have already mentioned (635), and doubtless other fruit trees may be profitably grown for fuel. The ailanthus and sycamore are both good fuel trees, if the wood is properly seasoned.

SECTION LII.—FENCES.—THE COST OF FENCING; LAWS REGULATING; KIND OF FENCE MOST ECONOMICAL; KYANIZING FENCE POSTS; FARM GATES; HEDGES; WIRE FENCES; STONE WALLS.

CALCULATING the cost of fencing is the only way that we can arrive at improvements in its economy. Those who have never considered the subject can not believe the facts; such, for instance, as that published by Nicholas Biddle, made from careful estimates, that the "fence tax" of Pennsylvania is ten millions of dollars a year; or that of R. L. Pell, that the farm fences of the United States cost $1,350,000, and that the annual charge upon farms to maintain fences is equal to $250,000,000 per annum. These are startling statements, but who can show that they are not facts? They are at least worthy of consideration from all farmers. Hon. Joseph Blunt, who was a very observing man, and during all the latter years of his life devoted a great deal of attention to the question of improvements in farming, estimated that there were in the year 1859, in the State of New York, 15,000,000 of acres under fence, and that this area was divided into 750,000 fields, requiring 120 rods to each field, making 90,000,000 of rods of fencing in the State.

He calculated the average cost of the fencing at the very low rate of seventy-five cents a rod, and that the average duration was not over ten years. His estimate makes the first cost $67,500,000. Interest and annual repairs may be reasonably calculated on the cost at ten per cent., which makes $6,700,000. Dividing the cost of renewal through ten years, makes a like sum, and gives an annual cost for fencing the State of New York, $13,400,000.

Hon. T. C. Peters, of Darien, Genesee Co., who as one of the State assessors has had great opportunities to obtain facts in relation to farm fences, made the following calculations, which were presented to the State Agricultural Society, October, 1862. He had devoted much labor to the calculation, because he thinks it necessary to enlighten farmers upon the subject of legislation in relation to fences, as the time is rapidly approaching when something must be substituted for rails, or else a different system adopted with stock.

In calculating the length of road fences, he assumed that the average is one mile of road to each mile square of land in the State, and Burr's Atlas makes the area over 28,000,000 acres.

The State census gives: Improved acres, 13,657,490; unimproved acres, 13,100,692; total, 26,158,782.

The town assessors make the area about 1,000,000 more. Mr. Peters divides the State into four districts, to show the waste lands in each. Thus:

1st District—North of the Mohawk Valley, and west of the line from its mouth to the north line through Lake Champlain.

2d District—East of that line, and east of the Hudson, including Long Island and Staten Island.

3d District—South of the Mohawk and east of the Chenango, including all the Catskill Mountain range.

4th District—All the remainder of the State.

He allots to each division the following number of acres of waste land: 1st district, 6,000,000; 2d district, 1,250,000; 3d district, 1,250,000, and 4th district, 1,500,000, making a total of 10,000,000 acres, still leaving 2,000,000 acres unaccounted for in and around cities and villages, which will give a remainder of 18,000,000 of acres of inclosed lands to bear all the burden of taxation for fences and roads, and will give, upon the calculation assumed, a mile of road to 640 acres of land, say 28,000 miles of highway and 56,000 miles of roadside fences. Assuming an average width of road of four rods, there are 224,000 acres occupied by the public roads of this State.

The average cost of fence is $1 a rod, and cost of annual repairs equal to the interest upon another dollar. Supposing the average value of improved land in the State to be $40 an acre, it makes the interest $2 80 an acre, or $22 40 the square mile.

Cost of road fence per mile	$640 00
Capital required for interest and repairs annually	640 00
Interest per square mile as upon improved land, for that occupied by roads	22 40
Total	$1,302 40
The total 28,000 miles of road-fence cost	$17,920,000 00
Annual interest	1,254,400 00
Interest on capital of sum necessary for repairs	1,254,400 00
Annual cost of fencing the highways	$2,508,800 00
Interest on value of land used and wasted for roads	616,000 00
Total annual cost of roads, besides labor of repairs	$3,124,800 00

The estimated average size of farms in this State is 100 acres, and the average size of the divisions of the farms ten acres. This requires 800 rods of fencing to each farm, which at $1 a rod makes $8 an acre as dead capital per acre, if we could devise some plan of carrying on farming without fences. Upon this basis, the total cost of fences in the State is $144,000,000, and the annual charge upon each farm, estimating them to average 100 acres, is $56, and it requires the interest of an equal sum to keep the fences in repair, making an annual fence tax of $1 12 an acre upon all the cultivated lands in the State, while all the State, county, and local taxes of the rural portion of the State are only 33 cents an acre.

This presents an array of figures well worthy the attention of all farmers who would understand the enormous amount of the fence tax.

John J. Thomas, of Cayuga County, thinks Mr. Peters' calculation too low; he has carefully estimated the highways, by the large and by local maps, at 60,000 miles, and 120,000 miles of highway fence in the State.

Is this enormous expenditure necessary? If it is, the burden must be borne. Will farmers inquire whether nine tenths of it could not be dispensed with most advantageously to the owners of the land, dispensing with many other items of cost which are incidental to the present system?

In no other country in the world is the fence tax so onerous as in this. Our fence system has been gradually engrafted upon the people by accidental circumstances, growing out of the necessity of early settlers, who fenced around the first cleared field, and let the stock run in the woods. Laws made at first to protect such settlers have been continued, and men educated to bear the heavy burden they have entailed, until they appear to love the law, or rather the custom that forces them to pay such a penalty.

The universal custom, and not the law—for really there is no such statute —has led men to believe that every owner of land is bound to fence all the world out, and that it is no trespass upon the rights of property to enter upon any uninclosed lot and despoil it of half its value.

To the cost of fencing should be added a very large sum in damages to railroad trains, which run over cattle wandering at large on the highways. Sometimes the value of human lives must be added to the account. To this add stock lost by accidents and straying, and the loss of costs of litigation about fences; also, expense of pounds, besides the ill-will and quarrels about stock on the highways, and trespassing upon neighbors' fields.

Indeed, the expense of the fence system is almost beyond calculation, and its evils illimitable. One of these is the actual keeping out of cultivation of millions of acres of good land. Let us look at a case.

If the law, or custom, which is stronger than law, were for every man to keep his own stock within his own boundaries, instead of fortifying himself to keep everybody's stock out of his fields, a poor man could go upon the Western prairies without a dollar of capital and take up public land and hire it plowed, on credit, to be paid for out of the crop or by his labor, and thus could in a few years become the owner of a good farm. He is kept out of this enviable position, because custom requires him first to fence his fields, and then plant them. To do this is impossible without capital. The lowest cost would be one dollar a rod, making the expense of inclosing an eighty-acre lot four hundred and eighty dollars. In many places it will cost twice that. Then custom requires division fences, say four twenty-acre lots, making a total of seven hundred and twenty dollars for fencing a lot of land that cost but eighty dollars for the soil.

The pasturage of all the stock which the owner of such a lot should keep is not worth the interest of the cost of fencing and annual repairs; and this is true of a million of acres in this country. Take that of the author, for example. It consists of eight acres of the rough but costly land of Westchester County, ten miles north of the Central Park of New York. It is bounded on two sides by highways, requiring 1,375 feet of fencing, and on the other two sides it joins two cattle-pasturing neighbors, requiring 530 feet more fencing for the half that the law of the State of New York compels an owner of the land to build, whether he has any use for it or not. To build such a stone wall, which is the common fence of the country, as any man of taste would be willing to have near his dwelling, is worth twenty-five cents a foot, making the first cost four hundred and seventy-five dollars for an outside fence, for which the owner has no use whatever. And this creates an eternal tax for interest and repairs, which at ten per cent. is forty-seven dollars and fifty cents a year, or nearly six dollars an acre—an annual tax of two per cent. of the salable value of the land, inflicted upon me by law and custom for the benefit of some poor neighbor who pastures his cow and geese and pigs in the highway, upon land he does not own. In effect he says: "The law, or rather custom, protects me, and you have no business to prevent my enjoying a privilege that I have always enjoyed. It is your business to keep your fences up and gates shut." And if I do not, he will rob me as literally as the highwayman who says, "Your money or your life!" and of the two, the highwayman is the most honest.

The division fence that I am compelled to build is equally onerous. It is utterly useless to me. I never shall allow cattle to run at large on my side. If my neighbors do, they should build the fence to hold their own cattle; it is not right to tax me with the cost of fence built solely for their use.

958. **Laws Relating to Fencing Highways.**—Statute laws do not require land-owners to fence highways. It is the law of custom—a custom that has been so long in use that many persons suppose it is law. The whole system is founded upon error. The law does protect property; it can not take it away from any owner, except for public necessity. It never takes it from one owner to give it to another, as it would if it authorized one man to pasture his cattle upon another man's land. The owner of land along a highway owns all but the right of the public to use it as a thoroughfare. No law can constitutionally give another man the right to mow or pasture the grass, nor compel the owner to fence out the cattle of others. His business is to fence his own cattle in. He has no right to let them run out upon the

highway, because they might obstruct travelers, who have a right to the whole roadway, to travel over it unmolested. If one pig is allowable, a thousand are, and who so blind as not to see that a thousand swine in a narrow lane would effectually blockade it against all travelers. And if one man can legally turn out one old cow to forage for her living upon the roadside, he may turn out a whole herd of bulls, which would break over any fence that a land-owner would build, and ravage his whole farm.

It is not law, by any enactments of any legislature, that any man may pasture his cattle in the highway, and it has frequently been decided by courts in different States, that the owner of land could recover damage of the owner of cattle, fence or no fence. It is custom, and a wrong practice long submitted to, that needs improvement. The idea that cattle can be lawfully turned out upon the highway is injurious to the great agricultural interest of America, and shows a dishonest principle in whoever puts it in practice.

Is there any difference in a moral point of view between sending children or cattle out upon the highway to forage upon neighbors or travelers. A man has no more right to educate his cattle in dishonest practices than he has his children, and public opinion should condemn one as well as the other. If an owner of a dog taught him to steal, the man would be held responsible as a thief, and the dog killed. The same rule should be applied to all animals. A thieving hog should be no more allowed to live than a thieving dog, nor his owner escape responsibility.

We can conceive but one greater nuisance in a neighborhood than a hog that is always on the watch for an open gate or hole where he can thrust in his nose and root a way into mischief, and that one greater nuisance is his owner. Every citizen should be made to feel that the law protects the owner of land as well as of houses, and that it is just as much a trespass to enter one as the other.

Domestic animals should all be made more domestic. It is the best way to save expense in fencing. It is a duty that we all owe one to another, to make this subject of fencing better understood. What it costs and what the law is, not what has been customary in regard to highway fences, should be matters of constant thought and frequent discussion in all farmers' club meetings.

959. **Laws relating to Division Fences.**—In the State of New York, by enactment of April 18, 1838, there is a most absurd and wicked law in relation to division fences. It is absurd, because it fixes the form, style, and strength of the fence to suit a peculiar condition of things in one place that is entirely inapplicable to another. It is wicked, because it compels one owner to build fence wholly for his neighbors' benefit, and declares that he shall not be entitled to any damages for trespass from his neighbors' cattle unless he maintains his part of the division fence in a strictly legal condition, whether his neighbor does or not.

In several States, the "lawful fence" is such a one as not one farmer in a hundred ever builds. If it lacks an iota of what "the law requires," it is no trespass to break over it and steal; that is, suffer the animals that should be domestic, but are not, to take that which does not belong to them. Such laws are wicked, because they are intrinsically unjust, and promote neighborhood quarrels, and in more than one recorded instance have been the moving cause of murders.

The law should be simply this: "Every man shall fence in his own stock; no man shall be obliged to fence his neighbors' stock out." This is founded in reason; it is common sense; it is justice. A common-sense law upon the subject of estrays, or cattle turned out upon the highway, and trespassing animals, would be to this effect: It shall be lawful for any one to kill a dog, goat, goose, or hog that comes upon his premises, or endangers them by running at large in the highway. Any land-owner in the State of New York may seize and confine any neat stock, horses, sheep, or swine found on his land or near it in the highway, and hold it till the owner pays the penalty and cost of keeping, and the owner has no action of recovery until all charges are paid. The law should allow the taker-up to use the animal while he keeps it, without charge; or convert it wholly to his use by paying its value, less the damage chargeable against the animal for its trespass, and those of the same owner in its company. All animals running without keepers in the highway should be liable to seizure as trespassers.

Such a law would be good for all honest men, and would promote goo morals in society. Can any honest man say that he believes it would be unjust or impolitic?

The laws of the nations in times that we call barbarous, were better entitled to the appellation of "civil law," than are some of our own about fences.

960. **Unfenced Commons.**—There is a tract within twenty miles of New York called Hempstead Plains, containing 12,000 acres of good arable land, which might have been in cultivation for two hundred years, if our fence laws had been adapted to a civilized state of society. Having been at first set apart as a "town common," when land was of but little value, it has been kept as such ever since, in the wasteful condition of a public pasture, which affords not one hundredth of the value to the people it would in cultivated crops. All over the country, around every village, there are similar, though not as extensive, unfenced commons, all of which could be cultivated if law and custom required owners of cattle to keep them within their own inclosures.

All over Europe are to be found highly cultivated districts, entirely free from fences. Every foot of common land, up to the very roadside, can be cultivated, and the most humble cottage upon the common can be beautified with its plat of flowers. Is America so much less civilized that we should give the possession of every unfenced common to hogs rather than to the use of the poor laborer and his family?

This is a fact connected with American farming that needs consideration.

961. **How Fences may be Dispensed With.**—First by the system of soiling, which would dispense with interior fences; saving land as well as fence; saving manure as well as time, in always having working animals and cows at hand; making animals more docile, so as to benefit the morals of farmers' boys, which are apt to partake of the character of the animals, and wild animals make wild men; and trespassing animals make bad neighbors and breed mischief. It is one of the reasons why fences should be dispensed with and a better system of farming adopted. Order and gentleness among animals and men grow out of their greater domestication under the soiling system.

Six leading, distinct advantages in favor of soiling are enumerated by writers upon the subject, to wit: Saving land; saving fencing; saving food; keeping stock in greater comfort, good health and better general condition; producing more milk; saving the manure by which greater cultivated crops are produced. To these Mr. Quincy adds three more, which he considers equally important. The animals are more docile and easier disciplined; they commit no trespass, as animals at large frequently do. The business of the farm can be conducted in greater order and comfort, and altogether more economically.

962. **Waste of Land Around Fences.**—A zigzag rail fence takes up a strip of land four or five feet wide, and if stake-and-ridered, the strip is about ten feet wide, which takes from every hundred acres, on the average, as fields are inclosed, full five acres—land which is rendered worse than useless; for it is a harbor for pestiferous weeds, animals, and insects, and often grows up into a most unsightly blur upon the face of the farm. What farmer would willingly endure a government five per cent. tax upon the value of his land? Yet this is just what he voluntarily inflicts upon himself in thus losing the use of land, besides the cost of the fence. This waste of land by fencing is enough of itself to condemn the whole system, if there were no other expense. Where land is valuable, as it is in many of the old States, crooked rail fences should be discarded entirely. No farmer can afford to keep such a fence upon land worth a hundred dollars an acre. If he must use rails, he should build the fence straight, which he can do cheaply by setting upright stakes, bound together by wire, to hold the ends of the rails in place. Such a fence looks more pleasing to us, though the other is called picturesque. It may be, but it is not utilitarian.

A board fence, although more expensive in the first outlay, would be the most economical on account of its saving of land; and on that account, wherever a fence can not be dispensed with, this saving should be considered. If a board fence is built for a permanent one, the boards should be battened over every post and nailed with what are known as fence nails, and the posts, unless of the most durable kind, should be kyanized, and always set in a position reversed from that of their growth.

963. **Kyanizing Fence Posts.**—The term *kyanizing* is taken from a Mr. Kyan, who introduced the subject in England within the present century.

It consists in filling the pores of the wood with mineral substance, such as sulphate of copper, zinc, or iron, which act as preservatives, just as salt does in meat. J. W. Fairchild, of Hudson, N. Y., kyanized posts for his garden in 1850, made of the refuse strips of a carpenter's shop, by using one pound of blue vitriol (sulphate of copper) to twenty pounds of water (you must not mistake pounds for quarts or gallons of water, as sometimes printed). In 1859 these posts were found as sound as ever. Without the kyanizing process every one would have been rotten and worthless. Even the pointed end of a small hand-stake, which had stood continually in the ground eight years, was found perfectly sound.

Spruce posts, which will not last two years unprepared, remain perfectly sound. Clothes-lines, or any other cordage, soaked two days in the solution used for the fence posts, are rendered more than twice as durable, and no doubt shingles would be greatly increased in durability. Posts, six inches square, need to soak ten days. The kyanizing liquor must be prepared in a square-sided vat made of plank, in a strong frame, with keys to tighten the joints. A barrel would serve while kept moist. An iron vessel would corrode. For small work a large earthen jar would do, or a vat might be made of water-lime cement. A vat that would only receive the ends of fence posts would answer, and it would soon pay cost upon any farm, where every post of every description, and many other things, might be kyanized with great profit. The solution must be renewed for every change of timber, by adding as much of vitriol to the water as will keep it at the standard strength. It makes no difference whether the timber is dry or wet, seasoned or green. Standing trees have been kyanized.

964. **Creosote for Kyanizing.**—In England, creosote has been found preferable to either sulphate of iron, of copper, or the chlorid of zinc or of mercury, either of which is much more expensive than creosote. Timber which had absorbed about eight pounds of liquid creosote to the cubic foot was apparently as sound at the end of five years as when first treated. Its reliability has been tested on quite a large scale on the Great Northern and the Lancashire and Yorkshire railroads (England), on which roads creosoted timbers that have been down for ten years appear to be as good as when first laid. Creosote is a liquid which may be made from the refuse of the trees that make railroad timbers. It can be kept in wooden tanks in which the timbers may be steeped several days All timbers for bridges, the sills of buildings, and the sleepers of railroad tracks should be treated with this substance, or some other equally as good. The refuse creosotic compounds of coal oil—those which are obtained from distilled coal as well as from the natural oil wells—may be as powerfully antiseptic in their nature as creosote distilled from wood. Experiments should be made to determine this, because such products are now thrown away as waste, whereas they may be usefully applied to render exposed timber ten times more enduring than it now is, and thus save millions of dollars to our country annually.

965. **Salt and Fence Posts.**—A correspondent says: "After setting white

oak posts, I bored into each about three inches above the ground with a two-inch auger, at an angle of about 45°, and filled the hole with salt and plugged it up. The plugs are all in, and the posts look as sound as when set. I put in about one half a pint of salt to a post."

966. **Fence Posts Top End Down.**—A farmer says: "I split two bar posts, side by side, out of a chestnut log eight feet long, eight inches wide, and three thick, and set one but down, the other top down. At the end of ten years the one set but down had rotted off, and I re-set it in the same hole. At the end of six years it was rotted off again, and I put in a new one. The other lasted two years longer, when it got split, and I took it out and found it was about two thirds rotted off. Sixteen years ago I set six pairs of bar posts, all split out of the but-cut of the same white oak log. One pair I set buts down, another pair, one but down, the other top down, and others top down. Four years ago those set but down were rotted off and had to be replaced by new ones. This summer I had occasion to re-set those that were set top down. I found them all sound enough to re-set. My experiments have convinced me that the best way is to set them tops down."

The theory of this increased duration is, that moisture can not ascend as readily when the order of growth is inverted.

967. **Charring Fence Posts.**—A writer in the *New England Farmer*, who tried numerous experiments in setting fence posts by reversing, salting, and charring, is satisfied that charring did no good. Those charred lasted no longer than those from the same tree not charred. Salting dry posts is beneficial. Salting green ones did no good. The best thing was reversing the ends.

968. **Portable Picket Fence.**—The principal use of this kind of fence is for hurdling; being set up zigzag, it supports itself, and is easily separated at each panel. The cost is about thirty feet of lumber for ten feet, and half the value of that for labor. A man and two boys can make fifty panels a day. Where lumber is not worth over ten dollars a thousand feet, this kind of fence could be made and sold with profit for one dollar a panel. Made of oak or similar wood, it will last in good order ten or fifteen years. The rails are cut exactly ten feet long, of stuff three inches wide and one and a half inch thick. These are bored by machinery very rapidly, twenty-nine holes in each rail. The pickets are sawed square and then turned one and a quarter inch diameter, at the rate of ten a minute. They are four feet long, pointed. The rails are keyed in a frame and pickets inserted and nailed in the top rail. The others are just tacked to hold them in place. If the fence is to be permanent, the rails are fastened to posts. If it is to be movable, the panels are held together by inserting a picket through the ends of the rails of two panels, which holds them together.

Locust posts for this fence are sawed three by three inches at the top, tapering to six inches one way. This is sufficiently strong, as the wind has but little hold of the pickets. It is sometimes called ladder fence, when made with only two rails. The best form is to use three rails; and sometimes, for variety, every other picket only reaches the middle rail. It is easily moved by panels from permanent posts. It is a good kind of fence for the Western prairies, where it has been considerably used. The machinery, including saws to make pickets and bore rails costs about one hundred dollars. Rails can be bored at any angle, so that pickets stand upright, while the rails correspond to the form of the hillside.

969. **Permanent Fence on Soft Ground.**—We were troubled by the upheaval and loosening of fence posts on the soft prairie soil of Indiana, and adopted the following effective plan: We laid down a sill two feet long under each post, at right angles with the line of fence just even with the surface, setting the posts in the center, nailed fast and supported by a small brace each side, nailed to the sill and post. This made a cheaper fence than with posts planted in the ground, because the timber used was much lighter, and except the sills, did not require to be of durable timber.

970. **Hurdle Fence of Boards.**—A plan for a cheap hurdle fence has been adopted, as follows: Panels of five narrow boards of some light timber are nailed with clinch nails through battens, one on each side of the ends and a pair in the middle. To make these, a mold should be made by cutting gains in three timbers, two inches broader on the face than the battens, so that when one is laid on the timber, the gain can be seen and the fence boards laid directly over. Then lay on the top batten and nail through; the point of the nails will reach through into the gains and not into solid wood. These panels being light are easily handled, and may be set up by braces on each side, or fastened to stakes driven into the ground. But a better way is to fasten the ends of the panels together with wire, or with hooks and staples, which are better and not much more expensive. One of the advantages of this kind of fence is, it can be made by any farm hands in winter, or at such times as out-door work could not be carried on advantageously. A similar fence to the above has been made of light round poles, of light straight rails, and of rived slats, in panels six or eight feet long.

971. **Farm Gates and Bars.**—We have given several good plans for gates in No. 364, and refer to the subject now mainly for the purpose of urging farmers to substitute gates for bars wherever they are liable to be passed through once a month. The difference of time in opening will pay the interest on the cost of a gate over that of a set of bars. Where a gateway is but seldom used, a board panel, made as described in 970, is a good substitute for bars, fastening it to the fence by hooks and staples.

972. **Wire Fence and Iron Fences.**—Fencing with wire has not proved a success. If made cheap it is not effectual, if made effectual it is not economical. A good wire fence, built by Col. Capron, in Maryland, was constructed as follows: The fence was forty rods long, made of No. 9 wire, attached to a permanent post at one end, and at the other end passed through holes in a post to keep them in position, fastened to a stout bar a few inches beyond the post. This bar was attached to a chain which passed around a

roller with a weighted lever, to keep the wires always strained. When the wires expanded, the lever fell, winding the chain, and the reverse when they were contracted by cold. There were but few permanent posts along the line; the wires were supported at short intervals of space by strips, which also supported bottom boards.

The following detailed account of cost of wire fence is made by H. F. French, of Exeter, N. H.: "On the 14th of August, 1852, I put up seventy rods of wire fence through the woods, using the trees for posts, occasionally driving a stake where more than eight feet intervened. I used three No. 9 wires annealed; the highest four feet from the ground, the spaces ten inches. I attached the wires to the trees, partly with small staples made of the same wire, and partly by sawing notches and driving nails over the wires. Four of us put up the seventy rods in one day. The cows have looked through each summer at my cornfields, but none broke through, and no repairs have been made. The cost was: 189 pounds of annealed iron wire at 6½ cents per pound, $12 27; labor of putting up, $4; nails, 25 cents; total, $16 52—being about 23½ cents per rod. To build a good fence against cattle, I should use No. 9 wire *not* annealed, because it is said to be stronger. Galvanized wire does not rust, but is expensive. The tension of the wires makes the whole strength of the fence, and to get them straight, if the ground is level, stretch the wires the whole distance. A tree at each end is the best post. It is almost impossible to set a stone or a wooden post that will not yield to the constant strain. If you set posts, set them very deep, and brace them with strong timbers resting against short posts set for the purpose. To strain the wires, take a stick of sound, hard wood, four inches diameter and sixteen inches long, bore two holes at right angles with a two-inch auger, one near each end, and a small hole through the middle to pass the wire through. Make two handspikes, say two feet long, to fit the auger-holes. Secure the wire at one end, and *unroll* it by trundling the coil along on the ground, so as not to get kinks in it, which you are sure to do in any other way. Bore a hole through the tree or post, and pass the wire through, leaving three or four feet spare length, and through the small hole in your windlass, and wind it round once or twice so that it will not slip; then put in the handspikes, and you can thus apply more power than four horses, and can hold the strain steadily. Then drive a hard-wood plug into the hole through the tree or post on the outside. This will hold till you take off your windlass and wind the wire a few times around the end of the pin. At eight feet distance along the wires drive small stakes and saw notches to receive and confine the wires by nails."

An Illinois farmer says his fence of No. 7 for upper wire, No. 8 for second, and No. 9 for two lower wires, built in stretches of forty rods, cost seventy cents a rod, and proved effectual.

973. **Flat Bar Iron Fence.**—There is a kind of flat bar iron fence with iron posts, made in New York by Hutchinson & Wickersham, at about $1 50 a rod, that answers a pretty good purpose, and is in one respect

superior to wire, because it is more movable; it can be used as a hurdle fence. Another kind of flat bar fence is made of hoop-iron nailed to wooden posts.

974. **Ornamental Iron Fence.**—The firm mentioned above have the greatest assortment to be found in the United States, of ornamental iron fence, made of what is called wove wire; that is, stout wire bent into forms to fit together, so that when properly connected and fastened in panels, and put together in the desired lengths, a light, strong, cheap fence is formed, suitable for yards, gardens, and balconies, and is extensively used for all sorts of ornamental fencing, being trimmed with cast ornaments.

Other ornamental fences are made of cast iron, in great varieties of patterns; so that iron in some shape is very fast taking the place of wood for all ornamental fences, and in many instances where utility and durability are consulted, without reference to ornament.

975. **Hedges, and Hedge Plants.**—The two leading plants for fence hedges in this country are thorns, such as are native to the locality, and Osage orange. The latter is more used in Illinois than anywhere else, and the former is employed for fencing in Delaware to a greater proportionate extent than in any other State. In Mississippi, and some other States south of lat. 32°, there is considerable fencing done with the Cherokee rose—a very rapid grower; and when untrimmed it soon takes up a strip twenty feet wide, and grows as many feet high. Of course it is a fence, and that is more than can be said of thorn hedges in general. We have also seen hedges of yucca, or Spanish bayonet, that were fences. The handsomest of all is the Osage orange. Holly at the South also makes a handsome hedge; it is an evergreen, and bears bright crimson berries. In Virginia there are some red cedar hedges. John Taylor, of Caroline County, author of "Arator," the oldest agricultural book in this country, fenced his plantation with cedar hedges. When young they were very handsome, but with age they outgrew their beauty and value as a fence. Honey locust makes a hedge that certainly is not handsome, though it answers tolerably well for a farm fence. As a general rule, any plant that naturally grows to a tree, makes a poor hedge plant. This is the case with Norway spruce (*Abies excelsa*), and with hemlock and white pine, which have all been tried for ornamental hedges. We believe for this purpose there is no evergreen at the North equal to arbor vitæ (*Thuja occidentalis*). It is very hardy, and limbs thickly from the ground, twenty feet high if desired; is of slow growth and does not naturally grow to a large tree, and it flourishes in almost any kind of soil, if not very dry. Its verdure winter and summer is handsome—much richer than cedar, which wears a sort of brownish appearance, as though the foliage were dirty.

976. **Forest Tree Hedges.**—Oaks are used for hedges upon Long Island, not planted and cultivated for the purpose, but permitted to grow along the fence row, and lopped down by half cutting the body and bending in the limbs and suffering the sprouts to grow into a thicket. It is a poor excuse for a fence, very unsightly, and not very economical, as the fence row oc-

cupies a wide strip of land. In France, the wild pear, wild apple, mahaleb cherry, elm, beech, hornbeam, Osage orange, buckthorn, hawthorn, Montpelier maple, scarlet oak (the hornbeam or iron wood), and tamarax gallica are all used for hedging.

The buckthorn is our most hardy and desirable hedge plant. It leaves out early, and no cold kills it, but it is not a certain barrier against unruly cattle.

977. **Osage Orange Hedges.**—The Osage orange is a native of the Southwestern States. It grows in great abundance in a wild state in Arkansas, where it takes more the form of a tree than a shrub, growing to the hight of thirty or forty feet, with a wide-spreading head, for which reason it is evidently unfitted for a hedge, except by constant severe trimming. It has been found hardy enough to stand most of the winters as far north as Detroit, the frost only affecting the young shoots. Plants are easily grown from seeds, and a quart will produce a thousand plants. The principal objections to the Osage orange are that it grows too vigorously, and is a most greedy absorber of all the nutriment in the soil within reach of its long roots.

Charles Downing, of Newburg, says of his Osage orange hedge: "Nothing goes through it; and it is equally true that nothing will grow near it. I shall have to dig it up, or dig a ditch alongside of it to cut off the roots so they can not destroy my valuable fruit-trees. You see how miserable the row next to the hedge looks."

978. **Ornamental Hedges.**—The barberry, althea, shepherdia, mahonia, willow, Japan pear (*Pyrus Japonica*), and privet are all used. For a summer screen only, privet, lilac, and several other hardy bushes; for a low screen, currants answer, and so do several kinds of roses.

In setting hedge plants, the very first step is to deeply trench the ground, and unless the soil is naturally rich, work in some well-rotted manure—that composed of leaves is excellent. We would not cut away the tops either before or immediately after setting the plants in the hedge row, because we think they will take root more firmly with the tops on than off, and if cut away the next spring, will grow so much more vigorously that they will make a hedge quicker than by the other course. Six or eight inches a year is all that you can safely increase a hedge. The clipping in May must be what persons unacquainted with the business would call very severe, leaving but a mere framework of stubs of branches.

979. **Stone Wall Fences.**—The author does not advocate their general adoption, though often hearing the remark, that "stone walls are the only permanent fences." When very expensively built, they are permanent good fences against all stock but sheep, but, as a general thing, are not permanent beyond the age of the generation in which they were built. The great Northern power that forms icebergs, and uplifts and carries off rocks of a thousand tuns' weight, lifts up and throws down stone walls, however firmly built; and then there is nothing meaner in the fence line than a mean, old, tottering stone wall. It is mean looking and a mean thing to depend upon as a fence. Sheep walk over it; hogs crawl over it; cattle push it over; high

winds sometimes make gaps in it, and frost often does; and when very old, it requires constant watching and frequent patching. The first cost of a good stone wall, fit to be called a fence, will be from three to ten dollars a rod, probably averaging twenty-five cents a foot in length.

One of the strongest arguments used in favor of building walls, particularly by farmers who divide up their land into four-acre lots, is "to get rid of the stone." As a general thing, they had better bury them where they would serve as under-drains. Stone walls waste land. Each one occupies a strip five feet wide, and it is not unusual upon pretty well cultivated New England farms, to find the earth, by repeated plowings, heaped up along each side, three or four feet wide, and occupied by bushes or briers, so that counting the wall two feet, and two feet each side, there is a width of six feet of land lost at each fence. If we calculate one half the contents of this strip around a ten-acre lot, for the portion chargeable to that side of the fence, we find the account stands thus: The equilateral sides of a ten-acre lot are 220 yards—660 feet long, making 2,640 feet around, which multiplied by half the width of the wasted wall strip, gives 7,920 superficial feet to be deducted from 435,600 feet, the contents of the ten acres. This is exactly one and eight tenths per cent., and is in reality equivalent to a tax of nearly two per cent. on the value of the land, besides the interest and annual repairs chargeable to the fence. If, then, a stone wall is a permanent fence, so is this self-inflicted land tax equally permanent. Will farmers think a little upon this fact?

980. **How to Build Stone Wall.**—For those who are not skilled enough to oversee and direct laborers, or know whether jobbers are cheating them, the following few simple rules will be useful.

Have the surface soil removed so that the foundation stones will rest on firm earth. Contiguous foundation stones should be as nearly as possible equal in size, and large enough to extend the full width of the wall, and every foundation stone firmly bedded in the ground. If boulders, or stones of uneven form are used, always plant the roughest side downward, or at least so as to have a flat side up to lay the next course upon. If your wall is built of a double line of stones, whatever their shape, it should frequently be bound across with flat stones or wooden ties made of split pieces of cedar, chestnut, white oak, ash, or any durable tough wood, from half an inch to one inch thick, two to four inches wide.

"Break joints" should be rung in the ears of a young wall-builder incessantly, until he would do it instinctively every time he laid a stone into the wall. You can tell at a glance, as you ride along the road, whether the wall was built by a workman, by the way the stones break joints. You may sometimes see them so placed that a joint extends from top to bottom. That wall was built by a cheat or bungler, probably both.

Beware of a jobber who is continually chinking small stones into the joints of the face of his wall and filling up the interior with stones thrown in as carelessly as you would fill up a hole in the ground. If you find your jobber working this way, discharge him peremptorily. He is both cheat and bungler.

If your wall is built double, cap it with a course of even-sized stones, so as to give it a uniform appearance. If the stones are generally flat, cap your wall with flat stones of even thickness and of a width greater than the wall. This not only helps the appearance, but sheds off water, which is often the means of destroying badly built walls, by running down inside and freezing so as to bulge out the two lines of stones with which the sides had been faced up and not bound together.

Good walls are sometimes built of very bad stones by using cross-binders of wood in the lower courses, and then near the top laying two boards, each about one fourth the width of the thickness of the wall along the line, and upon those building up the remaining hight. These boards will last many years and serve to hold cobble stone together quite firmly.

It is a better plan, however, we believe, not to build the wall as high by a foot, and take the strips of boards designed for binders in the wall and nail them to small posts built in so as to give sufficient hight for the fence.

A very common fence in some sections is built of cobble stone about two feet high, topped with two bars inserted in posts, or with strips of boards nailed on.

981. **Ha-ha Walls.**—Walls built with one face and backed against a bank are called ha-ha walls, and are very common in hilly regions, where stone abounds. These walls are often to be seen in Westchester County, N. Y., where they are backed by earth scraped up or carted to form the bank. This always appears to us bad economy; for a good ha-ha wall, even where the ground favors its construction, costs more than a plain wall, because it is necessary to build it very firmly to prevent the frost throwing it off from the bank. To guard against this, it should be built of large stones, made to lean heavily against the earth. A cobble-stone ha-ha wall would not stand many winters at the North—the frost would bulge it out, so that it would fall or be pressed over by the dirt.

Ditching each side of a wall appears to us of no great benefit, and adds very much to the waste of land already noticed (979). Throwing up a ridge to build the wall upon has no other advantage that we can see than saving stone where they happen to be scarce. This system is considerably practiced by Hon. A. B. Conger, of Rockland County, N. Y.

982. **Wall-Builders' Tools.**—A farmer who has not been bred upon a stony farm knows but little of the importance of having good tools to handle stone. Without good tools, wall building is not only expensive but very laborious. A set of wall-builders' tools would for three hands comprise three crow-bars, of three sizes, one of which should be of steel, three feet long and about three fourths of an inch diameter. This is for moving stones on the wall. There should be a cant-hook, similar to those used in saw-mills, but with a lighter handle. Each man should have a stone hammer, but these should vary in size, so as to interchange as occasion requires, and there must be one

heavy sledge. If any stones require splitting, a drill and wedges will be necessary. An iron square, a plumb, a line and stakes, a pick and spade will complete the assortment of tools for building the wall after the stones are hauled. For digging stones, use one of the lately invented stone-lifters, with which stones of five tuns' weight can be raised by one horse, and while held up suspended between a pair of large wheels, hauled to the line of wall. This is a great labor-saving machine. In the absence of such a machine, have one large and two smaller crow-bars, and a good lever and a well-made set of grappling hooks, which will often save hours of labor at a single stone, because you can pick two holes on the sides of a smooth stone to catch the points of the hooks in, by which the oxen will pull it out, when it would be a long, tiresome job to get a chain around.

A good stone boat is indispensable for hauling stones to a wall, and if the distance is long, it is a good plan to suspend the boat between wagon wheels just so it will clear the ground. If you have no wagon, use a cart, and suspend the forward end of the boat to the axle. This will be a great assistance to the team.

For loading stones on a wagon, it will be found a great saving of labor to have a frame with no sides, except a three-inch piece of scantling. The floor should be one and a half inch oak or other strong wood plank. At the hind end have a windlass roller fixed in posts about two and a half feet above the bed, with a chain and pair of grappling hooks, by which a man can raise a stone of five hundred pounds by turning the levers of the windlass. When it is chock up, a piece of plank is slipped under, from which it can be rolled forward with a bar, or by another windlass at the forward end. With a wagon rigged in this way, one man can load stones with ease that four men could only get up by hard work and danger. A movable triangle and windlass will be found a great labor-saving machine in handling stone. Set over a heavy block, it can be lifted in two minutes high enough to slip the stone boat under easier and quicker by one man than three could load it with crow-bars and hard lifting. The same implement can be used to put stones on the wall.

CHAPTER XII.

FERTILIZATION.

SECTION LIII.—THE ART, USE, AND ECONOMY OF MAKING, SAVING, AND APPLYING MANURES, AND FERTILIZING FARM CROPS.

HOW to make poor land fertile has always been, perhaps always will be, a mystery. If it is affirmed that barn-yard manure will do it, we reply, that is no mystery; but it is a mystery how to obtain it or its equivalent where it is not to be had. No man will ever make or keep his distant fields fertile by carting the contents of his barn-yard. In some cases the farmer seeks relief by resorting to a great agricultural humbug—the analysis of soils. Then he applies the pinch of powder which the quack recommends to restore the "missing ingredient," and sows his seed, and reaps disappointment. How to make barren land productive, or how to keep fertile land so, is what farmers most desire to know. We can not teach the art, but the following paragraphs we hope will add something to the farmer's stock of information upon this important subject.

983. **Fineness of Soil Promotes Fertility.**—Remember that the great secret of all naturally fertile soils is extreme fineness of the particles. Pulverization, as a rule, is better than manure. Disintegration is, however, aided by manuring as well as plowing and harrowing. Fertility will increase by deeply stirring the soil with turning and subsoil plows, and by aeration from under-drains, and by growing plants with deeply penetrating roots. That is why—

984. **Clover Promotes Fertility.**—Its roots penetrate and aerify the subsoil, while its tops shade, and when decayed fertilize the surface. The fertility of our soils must be improved by growing the manure on the land. That is, growing clover and other green crops to plow in, so that by very small additions of purchased fertilizers, to replace the things sold and taken off the farm, it will not only maintain its original fertility, but increase it, because it will be constantly drawing from the atmosphere. The difficulty about maintaining fertility is, that it is generally exhausted before the owner of the soil begins to think about saving. The question, therefore, is rather how to restore than how to increase fertility. Land will improve more while

growing a crop than it will in a naked fallow. Let that be forever remembered as the great secret of "How to increase fertility." Give each food or forage crop the proper pabulum to enable it to draw upon earth and atmosphere, and it will perfect itself, while it stores up in the soil pabulum for a succeeding crop, which should follow in rotation, without exhausting fertility. Von Thaer says feeding off a crop of clover with sheep will add twenty per cent. to the fertility of the soil.

985. **Color and Moisture of Manures Effect Fertility.**—Though not richer in humus, a black soil will be more productive than a light one, because the color elevates the temperature. This has been proved in cold climates, where melons were ripened by covering the soil an inch deep with charcoal dust. In Belgium, grape-growers improve light soils by spreading fragments of black slate over the surface. In addition to its fertilizing qualities, peat improves light soils by its color. Earth must be in a hygroscopic condition to be productive. Manure and black earth, and all salts added to the soil, improve this condition. Sandy land is barren because it has no hygroscopic quality. Add manure, peat, black earth, which give that quality, and the land produces far more than can be fairly credited to the substance added. All clayey soils are improved by under-draining, which both prevents excess of moisture and at the same time aerates the soil and helps to keep it moist in a dry time.

986. **Theory of Fertilizing Seeds by Incrustation.**—This is not a new theory, though newly revived in France, where works are erected to execute the process. The fertilizer is agglutinated to the seeds in quantity sufficient to furnish food to the young shoot until it gains strength to draw it from the soil. It is simply carrying out the theory of giving the plants an "early start." Boussingault planted the incrusted seed in calcined quartz sand, and added phosphate of lime, nitrate of potash, and vegetable ashes, and the plants grew luxuriantly, as though in garden mold. Sugar and soot mixed in water are recommended for coating wheat seed. Sugar, half a pound to the bushel; soot to make the mixture black as ink; water to make the stuff as thick as cream: to stand thirty or forty hours; then stir in the wheat. The editor of *The Valley Farmer* thinks this incrustation theory a dangerous doctrine, which if followed will reduce any soil to poverty. "As well," he says, "might we encase an eggshell with food for the chick as a grain of corn with food for the plant." We do not think so, and advise the incrustation to be tried by all farmers in a small way, and if it adds vigor to the young shoot, it may much more than pay the cost of application.

To coat seeds with plaster and lime: For each bushel of wheat use half a pint of tar dissolved in hot water reduced to blood heat, into which pour the wheat gradually, stirring constantly for a few minutes; drain the wheat in a basket over a barrel, then put it into a tight box, and add as much lime or plaster as will adhere by stirring until the grain is dry.

987. **Nitrates, Muriates, Sulphates.**—What are they? And which of them

is good for manurial purposes? We can not give this information in better form than in the following relation of Barnum's experience:

Barnum—*the* Barnum—is or was a Connecticut farmer. He has a passion that way. It is a hobby with him. He always has a hobby. Sometimes it is a "Fire Annihilator," and sometimes the Crystal Palace, or a Connecticut clockmaker, annihilates him.

One year he had the hen fever. That was his hobby. He rode it till he spent about $2,000, and then found that he had neither eggs nor chickens for family use. His neighbors' hens that "stole their nests," under the barn or by the side of the fence, hatched more chickens than his did, and when they were grown, they were healthy and good to eat, while his were drooping and sickly in their costly house.

Another of his hobbies was to renovate old fields by purchasing and hauling stable manure. That hobby broke down. It has broken down a thousand times before, but the more it broke, the more old-fogyism stuck to it. It was the ancient custom of the land to plow shallow and top dress with stable manure, sea-weed, and fish. Digging muck was an innovation. It was a good thing, but it did not bear long transportation. Something better was wanted. Somebody said, Use salt. That did not look reasonable. What virtue was there in salt to make plants grow? Somebody else said, Use saltpeter. But that was evident nonsense. Saltpeter was only to preserve meat—it was not manure. Another wise man told him Glauber salts were good, but a wiser one told him that Epsom salts were better.

"Bless your soul, man," says Barnum, "do you suppose I want to physic my land? No, sir; I want to feed it, and make it feed me."

So he took to the study of agriculture. He took several learned agricultural papers, and read them, and—well, he concluded that he was not the only humbug in the world.

So he went off lecturing upon humbug as a science, under the full impression that he had been about as badly humbugged, in the agricultural line, hens and hundred-dollar ducks included, as he ever humbugged anybody with woolly horses and Feejee mermaids.

Still he was not satisfied. He thought Connecticut soil had something in it, and if it could be stimulated to give it up, it would produce something besides daisies and mullens.

As he did not need to study his lecture—that came naturally—he bought Johnson's Chemistry, Norton's Chemistry, and Liebig's Chemistry, and devoted his leisure hours of traveling to search out what was the best and most concentrated manure to apply to his old fields. He had already done one very essential thing: he had plowed the soil deeper than it was ever plowed before; and now he wanted to manure better and cheaper, and make it more productive. So he studied agricultural chemistry. Therein he learned these facts:

That an application of 100 lbs. of *nitrate of potash* to an acre of land had doubled the crop of grass.

Again, he read that the same quantity of *sulphate of soda* had produced the same or a better effect.

It was also stated that *sulphate of magnesia* was still better, and that remarkable effects had been produced by a free use of *muriate of soda. Nitrate of soda* had also done wonders.

The author suggested that the farmer might procure a portion of each of these sulphates and nitrates and mix them together and produce a cheaper and more concentrated manure than superphosphate of lime or guano.

Full of this idea, Farmer Barnum returned to New York, and went forthwith to a dealer in drugs, medicines, and chemicals, and inquired the prices of—Nitrate of potash?—6 cents a pound. Nitrate of soda?—4 cents. Sulphate of soda?—2 cents. Sulphate of magnesia?—2½ cents. Muriate of soda?—1½ cents.

"Very well; put me up a hogshead of each."

In due time the farmer was ready to begin to use his new manures, or, rather, he was first curious—even showmen have curiosity—to see what these nitrates and sulphates all looked like. So he ordered the casks that had arrived to be opened for inspection. That was soon done, and the man, with consternation written upon his face, came back with handfuls of the contents, and reported:

"Mr. Barnum, you're sold—humbugged. Look here! that was marked "Nitrate of potash"—what do you call that?"

"That! that is saltpeter—nothing else."

"And this? This was marked 'Sulphate of soda.'"

"Why, that!—that"—and he tasted—"that—oh, pshaw!—that is Glauber salts."

"And this—sulphate of magnesia?"

"Bah!—that is Epsom salts."

"And shall I send them back?"

"Yes—no—hold on! Perhaps the druggist in the village has sent for them, and they have made a mistake, and sent my nitrates and sulphates to him, and his physic to me."

So he posted down to inquire; but no—nobody had sent for any Glauber salts; and he came back to write a letter and blow up the dealer who had befooled him. In the mean time the man had got the cask marked "Muriate of soda" opened, and reported that it contained—ha, ha, ha—simply common salt.

"What on earth," wrote Mr. B., to the chemist, "did you send me Glauber salts, Epsom salts, saltpeter, and common salt for? Do you think I want to pickle and preserve my land, and if I get in too much salt and saltpeter, physic it out? Only one of the casks contains what I ordered, and that is the nitrate of soda."

The return mail brought the answer: "Nitrate of soda, of course, is right, because it is not known by any other name.

"Glauber salts is, properly speaking, sulphate of soda, and sulphate of magnesia is nothing more nor less than Epsom salts.

"Salt, as we use the term, is salt, but it is a very unmeaning term among so many salts. Muriate of soda is the right name of our common, or table salt.

"And nitrate of potash is nothing but saltpeter; don't be afraid of it—it won't explode."

"But it did explode," said Mr. Barnum; "it exploded my ignorance. I had studied agricultural chemistry, but I did not know salt nor saltpeter. I do now, and I mean to know that they are good for land."

988. **Sulphate of Lime—Plaster of Paris—Gypsum.**—These names are synonymous, as used in common conversation, though not strictly so. "Plaster" is the most common term used by farmers, as applied to sulphate of lime reduced to powder by grinding, when used as a dressing for land.

Plaster of Paris is made of the gypseous rock of the vicinity of Paris, France, by grinding and heating, which prepare it for use in the arts, as we see it in casts of various figures. Gypsum, or plaster, which is ground sulphate of lime, is made of gypseous rock which is found in various localities in this country, and is composed of sulphuric acid and lime. It should always be applied on a green crop, and it does the most good on a succulent one, such as clover or peas, and the spring season is the best time to apply it, when the crop, whatever it is, is in a fresh-growing condition, from natural fertility or manure, since plaster is not a manure, but an assistant, acting as an absorbent of floating ammonia, which it yields up again to the growing plants. Plaster sown upon a plowed field in the autumn would be of very little if any benefit to whatever crop might be put upon the field in the spring. It is generally found more beneficial to clover than to any of the true grasses, which is accounted for by the fact that the ingredients of which it is composed are found most abundant in the ash of clover.

One of the best purposes to which plaster can be applied about a farm is in the stable and places of deposit of manure, to prevent the escape of ammonia, and thus keep the air sweet and healthy.

In some sections farmers complain of not seeing any benefits from plaster, while in others it is their main stay. We know two large graziers in Dutchess County, W. H. & David L. Belding, who have bought up worn-out farms and renovated them by the use of plaster, so as to produce the richest pasturage.

989 **Primitive Sources of Fertilizing Substances.**—There is an abundance of mineral substance, of the same chemical character as the fertilizing portion of manures, locked up in rocks. The Academy of Science, Paris, having investigated the question, say that the primary substances found in rocks, particularly the phosphates, which are almost chemically identical with bones, are really of but little or no value to growing plants in the first step of their progress; but that all mineral substances, the longer they have progressed through animal and plant life, the better they are as fertilizers. Bones are better than mineral phosphate, and bones of an animal that consumes phosphatic food are better than those of one that did not. It has been found impossible by any mechanical or chemical means known to reduce mineral phosphates to such a degree of fineness as we obtain from bones.

This is one reason why mineral phosphates are not readily assimilated by growing plants.

990. **Value of Phosphatic Guano.**—There may be some guano known as phosphatic that has some manurial value, but English farmers who have tried some of the substances sold under this name, have no faith in its value as a fertilizer. The editor of the *Agricultural Review* says: "From our own knowledge we can affirm that the guano from some of the West India Islands is not worth the price of the freight to this country." B. M. Rhoads, a chemist of Baltimore, thinks a pound of phosphoric acid in bone superphosphate worth three times as much as a pound in "brown Mexican guano."

991. **Gas Lime—Its Value to Farmers.**—Dana's *Muck Manual* says: "Gas lime contains sulphureted hydrogen, sulphuric acid, and ammonia. It can not be used agriculturally till it has been exposed to the air for a year, by which it is converted into sulphate of lime and ammonia, and carbonate of lime. In this state, mixed with three times its bulk of soil, it forms a useful top-dressing; or it may be added, before mixing with soil, to the compost heap or to meadow muck, say two bushels to the cord."

So we say it is valuable, but the farmer must know how to use it. The farmers of Lancashire, England, are well satisfied that gas lime is valuable when applied in small quantities upon pasture lands and meadows, which show the good effects of the application for years. One of our correspondents does not believe that gas lime fresh from the works is injurious. He applied it with beneficial effects at the rate of a pailful per rod.

992. **Lime Ashes.**—"Are the ashes of a lime-kiln valuable—that is, more valuable than lime?" Thus writes a correspondent. We answer, No; because from his locality we know the kiln is burnt with anthracite coal, the ashes of which are not worth hauling five miles to obtain the small portion of lime mixed with them. Coal ashes are not entirely valueless, but they bear no comparison to the value of lime. Where wood is used for fuel, the lime-kiln ashes are very valuable for all soils and all crops.

993. **How to Apply Lime.**—After the burnt limestone has been some time exposed to the air, it becomes air-slaked, and in the condition of a dry powder, and of twice the bulk it was before slaking, and may be sown broadcast by hand, or by a machine. If we were about to apply lime to wheat ground, we should harrow it in when we did the seed. On a potato field, we would sow it broadcast over tops and all, after hoeing. If applying it to corn, we would scatter it all over the surface of the earth, either before or after the last hoeing. As to the quantity per acre, the majority of opinions of those who have used lime most, favors thirty bushels of slaked lime per acre, continuing it every year, or every second or third year, until 120 bushels are applied. Lime is always beneficial to land full of vegetable matter. The quantity is to be varied according to the condition of the soil. One with much vegetable matter in it will bear much more than a soil almost destitute. Shell lime is the best. Barren fruit-trees have been made fruitful by dressing the land with lime, for it combines with the acids of the earth, neutralizes them, and

renders the earth sweet. In all muck land there is a resinous matter that prevents the decomposition of the vegetable fiber. This condition is always improved by adding lime.

994. **Value of Old Mortar or Plastering.**—There is no valuable substance about a farm oftener wasted, by throwing into the road, or into some mud-hole, or out-of-the-way corner, than the old mortar of chimneys and lath-and-plastered walls. It is because the fact is not known that this old mortar—the older the better—is a most valuable fertilizer. It is good upon any soil and upon every crop, used as a surface-dressing. It is particularly valuable in garden soil, which, notwithstanding its richness in nitrogenous manure, sometimes lacks just what it would receive from a dressing of this old mortar.

995. **Burnt Earth—Its Value as a Fertilizer.**—In England, whole fields are pared off and windrowed up with brush, straw, stubble, peat, or dried sods, enough to start the fire and heat the clay to an almost brick-burning heat, and then the whole of the burnt mass is spread over the surface, adding greatly to the fertility. Remember this fact, that burnt clay will always prove beneficial to raw clay, and still more so to sandy land, or to soil charged with nitrogenous matter, such as what we term good garden soil.

996. **Iron as a Fertilizer.**—Sulphate of iron (copperas) naturally exists in many soils, and, unless neutralized with lime, injures some crops. Yet iron in certain forms is undoubtedly beneficial, particularly to fruit-trees. M. Dubreuil, a celebrated European horticulturist, says that it has been proven "that melons and various species of fruit-trees, the green parts of which had been watered on several occasions with a weak solution of sulphate of iron, yielded much larger fruits than those not so treated." He adds: "One of my pupils repeated the same experiments in 1854 and 1855 on pear-trees. He gave the first watering as soon as the fruits were fairly set, in the end of June. He repeated the moistening every fortnight, in the evening, in order to prevent evaporation, and that absorption might be completely effected during the night. The solution was at the rate of 26 grains to a quart for the first three, and 35 grains per quart for the last two waterings." The result appears to have been a large increase in the size of the pears. Many soils contain iron, and such, if the iron is not in excess, are generally good fruit soils. Iron dust, from the forge, has frequently been used by florists to highten color of flowers.

997. **Save the Bones—Their Value.**—Never neglect to pick up a bone; it is worth saving. You would stoop for a copper cent; the bone may be worth a dime. True, it is of no value whole, except for grapevines, but it is easily made fine, and then its value is almost incalculable. Lying waste, bones are a nuisance in mowland or pasture. Pick them up and dissolve them into excellent manure.

998. **How to Dissolve Bones.**—Mix one gallon of sulphuric acid with five gallons of water and put in the bones, after having broken them as fine as you can with a hammer. The bones and liquid will form a pasty mass in a few days, if the acid is strong enough; if not, more must be added. The

water may be evaporated from the mass, leaving the acid combined with the phosphate of lime of the bones. This is unadulterated superphosphate, and is a very valuable manure. Bones may be also dissolved in unleached ashes, or horse dung, if broken up and mixed, or covered up. Charcoal-powder or plaster should be spread over the heap to prevent escape of ammonia. Sulphuric acid (oil of vitriol) is very corrosive, and must be handled with great care. We recommend a large iron kettle to be painted with a thick coat of earthy paint, or even clay dissolved in skim-milk, as the best vessel to dissolve bones in. A Scotch farmer adds 340 lbs. of acid to 25 bushels of fine bones, wet with 18 imperial gallons of boiling water, and lets it stand two days, and then mixes with two cart-loads of light mold, and turns the mixture over. At this stage the bones are only partially dissolved, but they heat and decompose in the heap after being turned over three or four times; and in the course of seven or eight weeks the compost becomes dry and breaks down with a shovel.

An American farmer says: "For every tun of bone I provide 500 lbs. of best sulphuric acid and 300 lbs. of guano, and get them distributed among the bone as equally as possible. By the fermentation and heating of the bone, better work is done with 25 lbs. of acid than we used to have with 40 lbs. One pound of acid requires nine pounds of water. Bones may be dissolved without acid, if crushed and mixed with fine earth or manure, and kept moist."

999. **What Manure will best sustain Fertility?**—Undoubtedly, barn-yard manure must hold the first place with all farmers—and rightly—because it contains all the needed ingredients, though it may not have all in as great a proportion as would be profitable to apply. Thus, to barn-yard manure muck, salt, and plaster may be added; and lime, applied to the same land that has been highly manured; and flesh, blood, hair, and bone will sustain fertility, and their constituents are all needed, because soil imparts nitrogen to its crops, and must have it returned.

The following table will show the per-centage of nitrogen in various substances, by which the value of manure made from them may be calculated. The greater the amount of nitrogen the better for manure.

	Water.	Dry Matter.	Nitrogen in natural state.	Nitrogen in dry matter
Barley straw	11.0	89.0	0.23	0.26
Oat straw	21.0	79.0	0.28	0.36
Rye straw	14.0	86 0	0 30	0.36
Wheat straw	18.0	82.0	0.33	0.40
Buckwheat straw	11.6	88.4	0.48	0.54
Meadow hay	11.0	89.0	1.15	1.23
Red clover hay	12.7	87.3	1.83	2.10
Pea straw	8.5	91.5	1.79	1.95
Carrots	87.6	12.4	0.30	2.40
Potatoes	74.0	26.0	0.39	1.49
Mangel-wurzel	87.0	13 0	0.29	2.27
Ruta baga	88.6	11.4	0.21	1.87
Barley	16.0	84.0	1.60	1.90
Malt	7.0	93.0	1.60	1.72
Wheat	16 0	84 0	1.90	2.14
Oats	16.0	84.0	2.00	2.38

	Water.	Dry Matter.	Nitrogen in natural state.	Nitrogen in dry matter.
Indian corn	18.0	82.0	1.64	2.00
Malt dust	7.0	93.0	4.00	4.08
Malt grains	6.0	94.0	4.51	4.90
Linseed	12.0	88.0	3.75	4.76
Beans, peas, or tares	16.0	84.0	4.00	4.76
American oil cake	11.6	88.4	5.04	5.71

If the following substances are used as cattle food, the comparative value of each tun, in manure, is represented as follows:

Decorticated cotton-seed cake	$27 86	Peas	$13 38	Oat straw	$2 90
Rape cake	21 01	Locust beans	4 81	Wheat straw	2 68
Linseed cake	19 72	Oats	7 40	Barley straw	2 25
Malt dust	18 21	Wheat	7 08	Potatoes	1 50
Lentils	16 51	Indian corn	6 65	Mangolds	1 07
Linseed	15 65	Malt	6 65	Swedish turnips	91
Tares	15 75	Barley	6 32	Common turnips	86
Beans	15 75	Clover hay	9 64	Carrots	86
		Meadow hay	6 43		

1000. **How to Preserve Manure.**—Horse droppings are very liable to injury by heating. When any manure is burned in the heap, it is little better than ashes. This can be prevented by the application of water to the manure heap, frequent turnings, and making compact piles. Mixing with sod, scrapings of the roads and walks, and swamp muck will retard decomposition. The best way to preserve manure is to apply it to crops, to grass, corn, and roots, and the orchard, followed by a shallow plowing. Cattle droppings should be mixed with those of horses, to preserve and improve both. If you have no cellar nor shed to save manure in, pile it up, mixing muck, sods, weeds, waste straw, salt, and lime to help decomposition, and plaster or charcoal on the surface to absorb and retain the escaping gases, and use a pump to send back all the drainings and other rich liquid, including urine and soapsuds, and old brine, blood, and all sorts of dirty water. Use this well-rotted compost, and you will escape weeds and grow grass and grain. Use all heavy manure upon home-lots, and treat outlying ones with some concentrated fertilizers and clover. If a manure pile is kept continually moist, its value will be preserved if the drainage is not wasted. When composted with muck and other similar materials, and kept wet, the fluid passing through the mass will pervade all parts, and without turning or forking in any way, the intrinsic value of each portion will be communicated to the whole, and improved by this mode of treatment. There is no item of economy about a farm that will pay better than that of saving every old rag, old shoe, old bone, soapsuds, house sweepings, chamber slops, kitchen garbage, and garden weedings for the compost heap; which in a year, from these little bits of waste, will grow into a valuable pile. Unlike purchased fertilizers, the cost of the compost heap is never felt in the pocket. It may be made in any convenient place, and will never taint the air if partly composed of swamp muck, or fine charcoal, or occasionally sprinkled with plaster. Everything that will decompose may be used. Every dead animal should be buried in its center, with muck or charcoal, or with fine clay, if neither of the first can be had conveniently. A cart-load of muck (decomposed with lime and salt) or of fine charcoal, such as locomotive cinders, or debris of a coal-yard, or fine charcoal and burned earth of a coal-pit, will prevent any smell arising from the carcass of a horse, and where manure is worth two dollars a load, the value of the compost heap will be increased ten dollars by every carcass buried in it.

1001. **How to Apply Manure—When and Where.**—We do not believe it is even a good practice to apply manure exclusively to hoed crops, or upon plowed land. We believe it would be found almost inconceivably better to apply it exclusively to grass lands, both mowing and pasture, and make them productive and capable of sustaining more animals, which would increase the production of manure, and then, by plowing under the enriched sod, any kind of grain or root crop would be produced at less expense per bushel than by the direct application of manure, except it was of some of the concentrated sorts, such as guano, phosphate, poudrette, or well-rotted compost, used to hasten the first growth. Whether this is a correct practice or not is the question that needs discussion and positive determination. It was discussed by some of the good farmers of the State of New York, at one of the meetings of the State Agricultural Society, with an almost universal opinion in favor of spreading upon the surface, and mostly upon sod.

We give a few of these opinions. In favor of top-dressing sod with manure, and plowing it under, Mr. Morely, of Onondaga County; T. C. Peters, of Darien, Genesee County; Lewis F. Allen, of Black Rock; Mr. Goldsmith, of Orange County; Mr. Marks, of Onondaga County; Mr. Leland, of Saratoga County; Mr. Williams, of Seneca County; T. W. Field, of Long Island; George Geddes, of Onondaga; Mr. Lyons, of Lewis County; Mr. Huested, of Ulster County; A. L. Fish, of Herkimer County; Mr. Bartlett, of Dutchess County; A. B. Conger, of Rockland County; and the author, of Westchester County. Mr. Lyons, of Lewis, has top-dressed meadows for fifteen years, without breaking up, with good results. Mr. Curtis, of Tompkins, said clover was the most economical manure for him. He seeds with rye, and uses plaster. Mr. Day, of Genesee County, is equally favorable to clover, but can not make it grow without manure. Judge Blodget, of Lewis County, finds ashes and plaster beneficial as top-dressing of grass lands, but thinks the most important thing is first to give the soil a good preparation by plowing. Mr. Sylvester, of Wayne County, always plows in manure. A. B. Conger thinks the manner of applying manure depends entirely on what sort of a crop is to be grown. If it is a deep-rooted crop, the manure must be deep buried to produce the best result. Upon grass crops it is probable that top-dressing is the most beneficial.

1002. **Sundry Experiments in Surface Manuring.**—Prof. Legnitz, of Elden, divided a lot into four equal parts. To No. 1 no manure was given. No. 2 received about two tuns of farm-yard dung, which was spread immediately and covered in by means of the plow. No. 3 was treated in the same manner, with this difference, that the hoe was used instead of the plow. The same quantity of dung was carried to No. 4, and allowed to remain spread three weeks on the soil before being covered in by the hoe. On the 10th of October, the four lots subjected to experiment were sown with about ninety-five pints of rye each. The following are the total results of the crops of each lot, grain and straw included: No. 1 produced 583 pounds; No. 2 produced 770 pounds; No. 3 produced 818 pounds; No. 4 produced 930 pounds.

1003. **Renovating Old Pastures by Top-dressing.**—One of the best things that can be applied to a rocky pasture infested with bushes, briers, or weeds, is salt. Salt them every week while wet with rain or dew, and let the stock look to that source alone for a supply. Pests of the pasture, including grubs, can be driven out with salt, while the grass will be improved. We doubt whether a pasture can be found that would not be so improved by a dressing of lime of from five to fifty bushels per acre, as to prove one of the most profitable investments that the owner could make. Plaster, at the rate of one half to two bushels an acre, may be applied to all old, rocky pastures. If any one doubts whether ashes would afford the most profit applied to a field of corn or a pasture lot, let him try the experiment fairly. A great many pastures have been grazed ever since the land was denuded of timber, and there is no lack of humus in the soil, but it is inert. Simple exposure to the air, and consequent decomposition of the roots of the sod, would make the soil again productive, and this would be the cheapest as well as best application; but where that can not be applied, lime, plaster, ashes, salt, superphosphate, niter, guano, or some other fertilizer, will enable the owners to carry more stock, and we should like to find the farmer who would say that that was not profitable, whether he converted the grass into beef, mutton, milk, or manure for his hoed crops.

1004. **Liquid Manure.**—I am satisfied that the correct method of treating all manure is to put it in solution in tanks at the barn, and send it to the field by steam power, just as has been repeatedly described as practiced by Mr. Mechi and others in England. Upon any farm, level or hilly, where the amount of team work to haul manure is large enough to justify the first outlay, there is no doubt in my mind that steam power is the cheapest of any that can be used, and the time will come when carting manure will be looked upon as a very slovenly way of farming. It will be found far more economical to dissolve it where it is made, and send it to the field through pipes, by a stationary engine. The people that come after us will look back upon this age of the world as we do upon the dark ages of the past, and wonder how it is possible that we could have been so stupid as to cart manure with oxen and horses, when it would be so much better and cheaper done by dissolving it, and using steam. The best crops to which to apply liquid manure are grass, clover, and small grain, but it may be applied with advantage to all hoed crops. The same order may be advantageously pursued in applying any sort of farm manure. That is, to grass first, and make the sod manure the grain crops. Small farmers, who can not send their liquid manure a-field by steam, may have a large cask or tank on wheels, with a sprinkler attached. A manure tank may be made just as we have directed for making cisterns. (333.)

1005. **Use of Tan Bark as Manure.**—Tan bark, when used as a manure, certainly produces very little effect, but when used as a mulch and suffered to decay, leaves all the potash that its ashes would give, the value of which, as particularly applicable to young trees, no one will dispute. For strawberries, we have never seen anything equal to tan bark. We would put it upon the beds in autumn, after forking up, and not remove it in the spring, except from the crown of the roots. In our opinion, not a bushel of tan bark should be allowed to go to waste, where there are farms within a mile or two of the tannery. Be sure that it will pay to cart it that distance to put around all fruit-trees, old or young, large or small, and upon all strawberry beds, because with it you can get good crops of this delicious fruit, upon almost any soil.

1006. **Manure is Gained by Soiling Cattle.**—Hon. Josiah Quincy, Jr., of Massachusetts, says: "Farmers do not generally seem to understand the importance of soiling cattle, on account of the great increase of manure; nor do they seem to understand how much manure can be increased by the use of absorbents, or how great is the value of the manure of a single animal." Upon this point the testimony of Dr. Dana is important, who states that one cow will make twenty-one cords of manure, equal in value to the average of good stable manure, if all her solid and liquid excrements are saved and composted with muck. In soiling cows, Mr. Quincy says, "we calculate that a square rod will support a cow a day. Grass, oats, Indian corn, and barley are the plants we use for soiling. Early in April we sow oats at the rate of four bushels per acre. Our sowings are April 5th, April 20th, and May 1st. We sow corn May 1st, June 1st and 15th, three bushels per acre. We sow barley ten days apart till August 1st. Another advantage of soiling is the saving of land. An acre will support three cows during the soiling season. It is almost impossible to calculate the value of manures, and how much corn can be saved by soiling cattle."

In a discussion upon this subject, Mr. Stewart, of Erie County, N. Y., said: "I find soiling not only beneficial to the animals, but to the land. One acre will do more in soiling than in pasturing, and the manure will more than pay all the expense; and I find that cut straw, steamed, with a pint of meal to a bushel, and fed three bushels a day to a cow, is better than timothy hay. I think soiling would double the value of farms, and that farmers would realize three times as much profit as in the old way. I grow carrots and turnips for spring feed. I consider sowed corn the best plant for soiling of any that I have tried. Butter made from corn will keep as well as that made from the best pasture, and have as rich a color." Prof. Sprengel, the celebrated German chemist, asserts that each cow produces annually 18,000 pounds urine, which contains of solid matter 900 pounds. This solid matter is fully equal to the best guano, weight for weight, so that the liquid manure of every cow kept on a farm for one year is worth, when applied to the crops, more than $20 annually, and so in proportion to all the rest of the domestic animals. It may be said that in no other department of rural economy does the American farmer lose so much by neglect, as in the management of solid and liquid manures.

1007. **Special Manures—Their Use Considered.**—Dr. Anderson (Scotland) gives as a reason why special manures should be used, that the diminished production of a field is rarely in consequence of general exhaustion of all fertility, but because one or more necessary ingredients have been carried off in the crops, or else were naturally deficient, and as plants can not grow without all their constituents are present in the soil, the absence of one may render the land comparatively barren. "A soil in this condition does not absolutely require farm-yard manure, but may be again made to produce abundant crops by the application of the one deficient substance, which is then called a special manure. When so treated, a soil will retain this renewed fertility for a certain time, but at length becomes again infertile, even under a continued application of this manure, which is then said, in ordinary language, to have lost its effect (become 'guano sick'), although the real reason is that the supply of a second constituent has been exhausted, and it also must be supplied in the form of a new manure."

Dr. Anderson thinks special manures should always be used in combination with those of the farm-yard. "A given quantity of the latter can, of course, produce only a certain amount of crop; but if mixed with a special manure, it is most rapidly converted into vegetable matter, and this is advantageous to the farmer. It may be urged that this is a matter of little moment, and that sooner or later the farmer receives back what he has put into the ground. But this is not the case; during six months of the year, manure lying in the ground is undergoing decomposition, although there are no plants to make use of it, and the constituents then set free are in part, at least, washed away and lost. Even if none of it were lost, it would not be altogether a matter of indifference; for, to take an extreme case by way of illustration, if we suppose a part of the manure to remain undecomposed for fourteen years after its application, it will, if only five per cent. interest on its price be reckoned, have cost the farmer twice as much as that which was consumed during the year of its application. Though I consider the use of special manures alone a most injudicious and shortsighted policy, which can rarely be employed with advantage, there is no question that their proper combination with farm-yard manure is really one of the most important improvements ever introduced into the practice of agriculture."

This is knocking in the head the very thing that seems to be most deprecated in this country—that is, using up the manure the first year of its application. The farmer forgets his interest account. It is, in fact, his interest to use up the manure in every crop it is applied to. His farm is simply a manufactory, where he takes in such crude materials as constitute manure, at a cheap rate, and converts them into salable crops, that he sells at a dear rate, or a profit upon the manufacture.

1008. **Guano—its History.**—Peruvian guano, which is the best, and the kind now generally used in this country, comes from the Chincha Islands, three in number, on the coast of Peru, between latitude 13° and 14°, in the bay of Pisco, about twelve miles from the coast, where rain never falls, and the air is always so dry that the juices of flesh evaporate so rapidly that meat can be preserved fresh, or dried without salt.

The waters surrounding these islands are almost alive with fish, upon which birds have fed and deposited their excrement upon the rocks for countless ages, which time has formed into a substance resembling yellow snuff, and almost as pungent as that article, and possessing the powers of fertilization to such an eminent degree, that two or three hundred pounds spread upon the poorest soil causes it to produce an abundant crop, even greater than a good dressing of farm-yard manure.

The North Chincha Island, from whence the principal supply of guano has been drawn, is about one and one half mile long and half that in breadth, upon which the guano was piled up over the rocks, giving it a smooth, round appearance, and a depth in the center of two or three hundred feet. Excavations have been made at one end, not by any means in the deepest part, a hundred and thirty feet deep, without finding bottom, to prove that the quality of the guano at that depth was equal to that near the surface. It is so compacted together that it has to be dug up with picks; and notwithstanding the vast number of cargoes taken away, the proportion the quantity removed bears to the quantity remaining may be guessed at, it can not be understood, when we state that actual surveys made by the Peruvian government gave the sum of the deposit upon the three Chincha Islands at TWENTY MILLIONS OF TUNS. This quantity appears so enormous that many have doubted its correctness. A French engineer, said to have been employed at a subsequent period by his government to ascertain the truth of this statement, has reported his estimate of the quantity at twelve million tuns. This amount still appearing too large for belief, Admiral Moresby caused a reconnoissance to be made, which the person who made it says was done in a very imperfect manner, very hurriedly, and without proper instruments, and in a measure secretly, and which gives the quantity at eight million six hundred thousand tuns.

Now if we take the mean of the three estimates it will give upward of thirteen million five hundred thousand tuns, and the mean of the French and English estimates is ten million three hundred thousand tuns, besides the deposits upon the Lobos and other islands, which have been reported at eight and a half millions of tuns. This would give eighteen million eight hundred thousand tuns as the mean of the French and English estimates, which would give to the world the same rate of supply as at present during the next century.

"*American Guano*" is the name given to the product of Baker's Island,

and other islands in the Pacific, much farther west than the Chinchas, and in a region subject to rains, which lessen the value of the deposit. It is nearly destitute of ammonia, but rich in phosphates.

1009. **Value and Economy of Using Guano.**—Although guano should not be exclusively depended upon, because it acts as a stimulant, and is mostly exhausted by one crop, yet upon all worn-out, sandy, or loamy soil the cultivator can afford to use No. 1 guano, at $70 a tun, at the rate of 200 lbs. per acre, well worked into the soil with small grain, if with that grain he will sow clover seed, so that the growth of that will take up all that the grain does not of the fertilizing powers of the guano, and in its turn serve for a rich dressing of manure to the land, renovating it so as to produce other grain or root crops without further application of expensive fertilizers. The price of Peruvian guano has risen since it was first introduced and extensively used in this country from about $45 to about $70 a tun. and at that some of our farmers fear its use is not economical. This depends whether he can grow a remunerative crop without purchasing some fertilizer. If he can not, then it is probable that guano is as economical as anything in market, since many experiments prove that a dressing of 200 lbs. of Peruvian guano, upon grass and grain, has doubled the yield per acre. Its most profitable use is upon very poor land, to give it a start, so it will produce clover, which it will do upon an almost hopelessly barren soil. If its use is long continued, without other manures, the application becomes unprofitable. Where it has been most extensively and longest used in England, the farmers say that the land has become "guano-sick."

1010. **How to Apply Guano.**—If we were applying guano to land for corn, potatoes, or any other crop, we should prefer to do it by sowing broadcast and lightly plowing in. If applied as a top-dressing—which is rarely advisable—always apply it, if possible, before rain, or when snow is on the ground; and if on arable land, harrow, hoe, or scuffle immediately after.

There is no benefit in mixing guano with anything, unless it be water, to be used for garden purposes. In that case it should be made a very weak solution, or it will kill all it comes in contact with, whether seeds or plants.

1011. **Use and Value of Muck or Peat.**—We lay it down as an incontrovertible fact, in all the Eastern States, that every farmer who has a muck-bed can double the value of all his other manure by the use of muck, over and above the expense of digging and hauling any reasonable distance. It should not be applied fresh, but composted with stable, pig-pen, hen-roosts, and privy manures. It is a great deodorizer. Sometimes a mass of matter is found in the bottom of a pond or swamp, composed almost entirely of vegetable substance. Such will bear hauling a considerable distance. Where the deposit is very fibrous or peaty, it will be advisable to burn it and use the ashes. Occasionally a muck-bed is so largely composed of silt, the most of which is sand, that the deposit will not bear long transportation. It will, however, always prove beneficial where it is applied. Some deposits are so entirely composed of vegetable matter, that when dry they burn, and leave no more ashes than the same bulk of chips would. Such deposits are called peat, and are often used for fuel, and would be valuable to burn for ashes, which could then be hauled long distances with profit. All peaty substances have an antiseptic quality when wet, and a great deodorizing power when dried and pulverized. Hence its value as an absorbent of ammoniacal gases arising from stables, sinks, and decaying vegetable and animal matters.

One of the benefits of peat in soils is disintegration, and another, darkening the color. It is believed that the acid of peats exerts a powerful decomposing power, and ultimately solvent effects upon minerals in the soil. It certainly influences the temperature. Potatoes have been found ripe two weeks earlier in a peaty soil than in one of a light color.

By analysis, dried peat has repeatedly shown a greater per cent. of ammonia than the best stable-yard manure, and when mixed with that in equal quantities, the mixture has proved more valuable than the manure in a pure state. These facts are sufficient to induce all farmers, as soon as they learn them, to add to the bulk and value of stable, and all other manures, whenever they can have access to a muck deposit. Every one who will look at the following table of analysis of two samples of peat, such as are found in all parts of the country in swampy places, will see at a glance that such substances must possess manurial value.

1012. **Analysis of Peat.**—This analysis was made by Professor Johnson, of Yale College, who says: "It doubtless gives a fair idea of the inorganic ingredients of the majority of the peats," in the State of Connecticut:

Analysis of Peat Ashes.	I.	II.	Analysis of Peat Ashes.	I.	II.
Potash	.69	.80	Chlorine	.15	.43
Soda	.58		Soluble silica	8.23	1.40
Lime	40.52	35.59	Carbonic acid	19.60	22.48
Magnesia	6.06	4.92	Sand and charcoal	12.11	15.04
Oxyd of iron and alumina	5.17	9.08			
Phosphoric acid	.50	.77		99.13	100.74
Sulphuric acid	5.52	10.41			

Another analysis of peat, suitable for fuel, is given below, made by George F. Barker, of Charlestown, Mass., and is compared with Professor Voelcker's analysis of well-fermented farm-yard manure, composed of dung of horses, cows, and sheep:

	Peat.	Manure.		Peat.	Manure.
Water expelled at 212 degrees	18.050	75.420	Oxyd of iron and alumina	.310	.673
Organic Matter: Soluble in dilute solution of carbonate of soda—soluble geine	27.190	16.530	Phosphoric acid	.030	.450
Organic Matter: Soluble in solution of carbonate of soda	48.840		Sulphuric acid	.331	.121
Potash	.041	.491	Chlorine	.009	.018
Soda	.035	.080	Soluble silica	.494	1.678
Lime	2.431	1.990	Carbonic acid	1.175	1.401
Magnesia	.364	.138	Sand and charcoal	.700	1.010
				100.000	100.000
			Potential ammonia	2.920	.735
			Matters soluble in water	1.800	5.180

This analysis shows that peat contains five times as much organic matter, and four times as much potential ammonia as farm-yard manure; and it contains more lime, magnesia, and sulphuric acid, but less phosphoric acid and potash; and taken altogether, it will be seen why they are so well fitted for mixing together. Where not so mixed, bone dust and ashes, or phosphate and potash in some other form, should be used with the peat. It may happen that another deposit of peat would contain all the ingredients, and be actually more valuable than stable manure, as soon as it is decomposed. For heavy soils, peat or swamp muck should always be composted with strong fermenting substances, such as horse and hen droppings and animal matters. Some peats are so charged with iron that they are positively injurious to land until they have been long exposed to the air or mixed with some other substances.

The best thing to decompose muck and fit it for convenient use in stables, is lime that has been slaked with water saturated with common salt. Ten bushels of this lime powder may be mixed with 100 bushels of muck. Where fish are used for manure, they should always be made up in a muck compost, until the whole mass becomes homogeneous.

1013. **Mixing Muck with Night Soil.**—Poudrette and tafeu are names of manures sold in most of the cities, in barrels, at high rates, and much appreciated by farmers and market gardeners, to give vegetables an early start. Every farmer can make his own tafeu as well as buy it, for it is nothing but night soil and peat or muck in a fine dry powder, mixed with the excrementitious matters to absorb the moisture and deodorize the substance, which is then thoroughly dried and packed for transportation. In the manufacture of tafeu, in a domestic way, one of the best divisors and deodorizers is charcoal dust. Fine clay or loam will answer every purpose, only requiring a greater bulk. Cinders of locomotives that burn wood are excellent.

1014. **Sea-Weed for Manure.**—Upon all sea coasts, the fertility of the cultivated fields may be much increased by the use of what is called sea-weed, which consists of marine plants cast ashore or gathered from the rocks under water. The latter is called rock-weed, and makes a richer manure than the variety cast up by the waves. Rock-weed is exceedingly gelatinous, and consequently valuable for manure. A good method of preserving all the properties of rock-weed is to spread the green plants upon the surface, and turn them deeply under by the plow. All sea-weed is used to the greatest advantage immediately after being taken from the sea-shore, in the freshest state possible, while perfectly saturated with salt water; if that is permitted to drain from it, decomposition at once takes place, and the value is diminished. In the wet, green state it will add fertility to land already rich, and improve the poorest soil.

1015. **Tanners' and Glue-Makers' Scraps for Manure.**—One who has used them says: "When I first used tanners' scraps, I found they injured the crops. Now I consider a tun of them, properly decomposed by the aid of oil of vitriol, and composted with swamp muck, worth as much as three fourths of a tun of Peruvian guano. The horns and piths are also very valuable, as they contain much phosphate of lime. Bone earth is so valuable, that if applied to a lot covered with five-finger vines, it will renovate and make the field productive. Any way to decompose these tan-yard substances will make them very valuable, more so than any farm-yard manure."

We have used the waste of a glue manufactory with good results, applied directly to grass land, and also to oats. It consists of hair and scraps of flesh, mixed with lime.

1016. **Forest Leaves for Manure.**—At the beginning of winter, every day not otherwise necessarily engaged can be profitably occupied in gathering leaves. There is no danger of getting too large a quantity; they will be of service in many different ways, and prove of great value when decayed and united with the compost heap. There is no substance that can be used for mulching, or winter covering of plants, equal to the forest leaves, because they not only give protection, but in their decay, fertility to the soil. Leaves contain potash and tannin, which make them valuable for covering strawberry beds; and for stable-bedding there is nothing better, and their value in manure will more than pay the cost of gathering. Every acre of woodland would afford a pretty fair dressing for an acre of corn land, if the leaves were gathered and composted. If used as litter in yards and stables they are worth saving, but not worth half as much as they would be in compost. The same thing may be said of straw and cornstalks. Suffered to decay in the open air, more than one half their value is lost. Buried in compost, all would be saved and become fine manure.

1017. **Turf Ashes for Manure.**—Neighbor A. had a piece of swamp adjoining the land of neighbor B., which in draining afforded him a vast quantity of material to fertilize his upland. Seeing what A. had done, B. went so far with his part that he cut off the tussocks and piled them up as a line fence on the edge of A.'s open ditch that he had dug to carry off the water of the tile-drains. By-and-by A. complained to B. that his fence was a nuisance, for it grew weed-seeds that blew over upon his tilled land. B. also acknowledged it was a nuisance, not in the growth of weeds, but that it was "of no account nohow as a fence."

"Why not haul it away, then, and put it upon your corn or grass lots on the hill?" said neighbor A.

"Well, to tell you the truth, I haven't no faith in it."

"Why, you buy ashes. Don't you think that such a mass of vegetable matter contains potash?"

"Well, I don't know. May-be it does; but I guess it don't contain enough to pay for hauling. But as you like such stuff, I will tell you what it is: If you will haul it away, you may have it in welcome—the whole string."

"When shall I get it off?"

"Oh, any time you like, between now and planting-time next spring."

"Enough said. I'll do it."

"Very well. No half-way work; you must make a clean sweep of it; take everything off down to the surface."

"I'll do it."

So they parted. B. bragged a little that he had hitched A. to the biggest load he ever undertook. "He has no idea how many loads he will have to pull up that hill. He won't do it, but I shall have the laugh at him when he gets about half of it off and backs down on the balance."

Several times before autumn B. dropped a hint that he thought A. had better begin his big job. A. said it "wa'n't quite dry enough yet." It got very dry, however, in September—dry as tinder, B. said. A. took a look at it, and he thought it "was dry enough." So, one hot, sunny day, he walked down with a few matches in his pocket—handy things those matches, for with them he lighted the old tussock fence into a roasting hot fire, that reduced the whole string in two days to a pile of biting strong ashes, which did not require a very great outlay of team-labor or hand-work to get up on the hill, where they made a mark that has not been effaced yet, and probably will not be until after the owner has said to himself several times: "Why the deuce didn't I think about burning the useless old fence and haul the ashes on my own land? You won't catch me in such a trap as that again."

We wonder if there are not some other people in the world who may profit by this man's folly, and learn that dry tussocks will make ashes, and that ashes are good manure.

1018. **Wood Ashes for Manure.**—No farmer in the old States can afford to sell ashes, for any price that the soap-boiler will pay. Where oats lodge, as they are apt to do upon manured land, an application of ashes would save the crop. Leached ashes are much used upon Long Island, but we doubt the economy of the application, as they cost about ten cents a bushel at Albany. When leached ashes have been exposed to the air a long time, they are more valuable than when first leached. Potash, the chief constituent of wood ashes, is a necessary element for most plants, not only as direct food, but as an agent for rendering silex and other constituents of the soil capable of being absorbed and appropriated in plant life.

1019. **Potash as a Substitute for Ashes.**—Although we believe unleached ashes a cheap manure at twenty-five cents a bushel, we have no doubt that the same effect may be as cheaply produced by purchasing a crude kind of potash, such as comes from the Syracuse salt works, and has usually cost fifty dollars or sixty dollars a tun. If potash is used, it must be in powder, mixed with dry muck, coal dust, or fine loam, as a divisor. Concentrated manures generally contain very little or no potash. In guano it rarely exceeds three per cent. Superphosphate of lime can contain none of consequence. Potash can not be economically added to manufactured manures, because nearly pure potash, or even the raw material from which it is made, can be more economically used separately. If any manufacturer of manure says it contains much potash, you may ask how he can afford to use it.

1020. **Coal Ashes as a Manure.**—"Are coal ashes of any benefit as a manure?" *The Genesee Farmer* says: "That coal ashes are of some benefit, there can be no doubt. Numerous analyses of them have been made. We have now before us analyses of ashes from different kinds of coal. They vary considerably in composition, but on an average contain about 45 per cent. of silica, 40 of alumina and oxyd of iron, 12 of sulphate of lime or plaster, 2 of magnesia, and 1 of phosphoric acid. Commercially, coal ashes have no value as a manure, but to every farmer are worth something, and ought not to be thrown away. It is said they are good as a top-dressing for lucern and red clover. They are frequently mixed with night soil for the purpose of absorbing unpleasant odors. They are often employed in the garden, more for the purpose of forming walks and preventing the ravages of mice, than as a manure. Covering early-sown peas with coal ashes is said to forward their growth, as they tend to absorb the rays of heat."

1021. **Value of Soot as Manure.**—Soot is worth nearly as much as guano. Try it upon the grass plot, the flower bed, the melon patch, the grapevines, or any other plants. Mixed with water, and sprinkled upon vines, it will aid in keeping off bugs; spread dry upon the surface, it absorbs heat and hastens growth. Upon flowers it adds beauty to their colors as well as strength to the plants. Farmers, sweep your chimneys and save the soot, and you will save a very valuable manure.

1022. **Magnesia as a Fertilizer.**—Magnesia is found abundant in the mud of the Nile, which is very fertile; and in some of the richest marls that have been analyzed, it was found in quantity sufficient to destroy instead of improve soils, if it had been as deleterious as some suppose. The salts of magnesia may be employed, as the salts of lime, for fixing ammonia, but in that case the profit of its application will depend upon its cost. In one reported experiment, the phosphates of magnesia and ammonia, when applied at the rate of one hundred and thirty to two hundred and sixty pounds per acre, had a powerful effect upon the production of Indian corn; at the rate of three hundred pounds per acre, it increased the crop of grain six times, and of straw three times.

1023. **Theory of Atmospheric Fertilization.**—Whether the nitrogen which exists in the air, forming seventy-nine hundredths of its mass, supplies the nitrogen essential to vegetation, or whether this element is obtained, during growth, from salts in the earth, or from volatile nitrogenous compounds in the air, has never yet been satisfactorily determined, and until it is, our advice is: Look well to your manure heap; enlarge it as much as possible, by adding to it all the coarse straw, stalks, and offal about your buildings. You may also enlarge the pile, and add to the value of your store, by gathering weeds, or sods, or road-washings and muck. Sprinkle the heap occasionally with plaster, but never add lime. Slops of the house and soap-suds will add to fertility and hasten decomposition, and prove far more reliable than any dependence upon the atmosphere.

1024. **Phosphorus as a Fertilizer.**—Phosphorus is found in all animals, combined with a particular organic substance in the brain, the spinal marrow, the spermatic fluid, and in the milt of fishes, and certain mollusca, and also in all vegetables. It exists in combination with oxygen in all rocks, in all soils, and in the flesh and bones of all animals, and their secretions. Some of the fossil excrements of extinct animals are of great value as fertilizers. The apatite rock of Estramadura, in Spain, contains eighty-one per cent. of phosphate of lime, and is so abundant that it is used as a building material. In the United States, mineral phosphates are found in many localities, particularly in Morris County, New Jersey, and at Crown Point, in the State of New York. The mineral was crushed and sold in our markets as a fertilizer, but it has gone out of use, because it was found that the phosphorus of bones was, in a progressed form, of an almost inconceivably greater value than that in its native condition in the rocks.

1025. **How to Detect Adulterations of Superphosphates.**—The superphosphate of lime, from its comparatively high value, leads to adulteration. Water is added to increase the weight; earths, chalks, lime, old plaster, and oyster-shells are sometimes mixed in a manner to deceive the eye. Some of these substances may be detected with the aid of a magnifier, by acids, or by simple washing with water and examining the residue after decanting. If old plaster is suspected, the hair will be seen; if oyster-shells or chalk, the effervescence and particles of shells will furnish indications which will lead to closer scrutiny. The sulphate of barytes, or sulphate of lime, increases the weight of the mixture, and the former, particularly when thrown into a tumbler of water, will fall to the bottom more rapidly than the superphosphate.

1026. **Green-Sand-Marl Manure.**—This valuable manure abounds in New Jersey, and is one of the best things ever applied to a light sandy soil. Its appearance is not unlike common musket gunpowder, except instead of the grains being black, they are of a greenish color. The application of niter to grass, and potash to woody plants, has shown that both, in their place, are of almost inconceivable value to farmers, but not more so than green-sand-marl, which contains an appreciable quantity of potash.

1027. **Norwegian Fish-Guano Manure.**—In the year 1855 a company in Norway was organized with a capital of $100,000, to render available the great mass of refuse hitherto thrown away in the preparation of codfish at the Loffoden Islands, about 300 miles north of Christiania, where enough of this refuse is thrown away to make 2,500 tons of fish-guano annually. In comparison with good Peruvian guano, this new guano proved to be as follows: Upon cereals, one pound of fish-guano was found, in twenty-five experiments, to produce an average increase of 9.1 pounds, while Peruvian guano produced, in an average of twenty-three experiments, an increase of 6.3 pounds. Upon root crops, one pound of fish-guano was found, in an average of seventeen experiments, to produce an increase of 15.6 pounds, while one pound of Peruvian guano, in an average of the same number of experiments, was found to give 17.3 pounds of increase. The whole of the experiments showed that the fish-guano was very nearly equal to the best Peruvian guano, weight for weight.

1028. **American Fish-Guano.**—Two companies, similar to the above, are in operation in this country, one in the State of Rhode Island, and the other on the south side of Long Island. They make fish-oil of the scup or porgies, and the menhaden, caught so plentifully along the coast. The very considerable residue after the extraction of the oil, composed of the skin, bones, and muscle of the fish, is dried and ground into a powder, which bears a close resemblance to the imported guano, and is sold at about forty dollars per tun. This manufacture might be widely extended if these companies would take the trouble to introduce their article to the notice of farmers generally.

1029. **How Much Manure Should we Use?**—We answer: Just as much as can be converted into paying crops. Take five acres in corn:

No. 1	with $10	worth of manure,	40	bushels,	worth 75c	$30 00
No. 2	" 20	" "	55	"	" "	41 25
No. 3	" 30	" "	69	"	" "	51 75
No. 4	" 40	" "	83	"	" "	62 25
No. 5	" 50	" "	97	"	" "	72 75

Let us now suppose that the rent of soil, taxes, cost of cultivation, will cost $15 per acre, so that with No. 1 the cost of manure and other expenses would be $25, leaving a profit of $5, besides the value of the stalks, which will range throughout in a fair ratio with the yield of corn—then the profit would stand thus: No. 1, $5; No. 2, $6 25; No. 3, $6 75; No. 4, $7 25; No. 5, $7 75. The second year, without any additional manure,

No. 1	would yield	30 bushels,	worth $22 50	profit	$7 50
No. 2	" "	45 "	" 33 75	"	18 75
No. 3	" "	59 "	" 44 25	"	29 25
No. 4	" "	73 "	" 54 75	"	39 75
No. 5	" "	87 "	" 65 25	"	50 25

The true science of manuring is to convert the manure at a profit into salable products. If the land will produce, say a profit of $20 an acre upon the labor employed, without manure, and with the same labor it will produce a profit of $40 an acre over the cost of manuring, then it is certainly much more profitable to buy and apply the manure, whether guano or any other suitable substance, than it is to work without manure.

1030. **Manuring with Green Crops and Lime.**—Green crops plowed under are powerful auxiliaries in rendering a light soil fertile. But if this is done too often successively, it eventually renders the soil too carbonaceous—*i. e.*, too full of vegetable matter. This must be corrected by the application of lime. Some farmers complain that they do not get a sufficient increase of grain to pay for the use of guano. They would get the full value of the guano if they would always sow clover seed on the grain, so as to have a crop of clover to turn under as manure. Land that is kept rich by green crop manuring never gets as full of weeds as it does from stable manure. The manure made from one tun of clover hay is worth as much as that made from a tun and a half of timothy or meadow hay. There is no doubt on this point; and it is one reason why we urge the importance of an increased growth of clover as a means of enriching the soil. If the manure obtained from the consumption of a tun of meadow hay is worth $6 43, that made from a tun of clover hay is worth $9 64, or half as much again—and this is true everywhere.

1031. **Value of Manure Depends upon Fineness.**—All costly fertilizers should be examined in regard to their fineness. If properly prepared, they are nearly in the state of impalpable powder. To prove this, pass a small sample through a fine sieve. This extreme fineness is the principal secret of the immediate benefit derived from guano. It has been stated that two bushels of bone-dust were worth more for immediate use than one hundred bushels of whole bones. Leather shavings, woolen rags, hair, oil-cake, and similar substances, are valuable manures, because they contain a large percentage of potential ammonia, perhaps equally as large as the best samples of guano, yet their action is much slower. In all manures which contain potash, it is in such a mechanical condition that it is much more readily absorbed by plants than the native potash of rocks; and this is true of nearly every other mineral substance.

1032. **Value of Shelter for Manure.**—In England, Lord Kinnard made a variety of experiments proving the value of protecting manure from the weather. Twenty acres of rich, dry loam were selected, one half of which was manured with manure which had been housed, and the other half with that which had been exposed, at the rate of twenty loads to each acre. The whole was plowed and planted to potatoes, each part receiving the same treatment. Here is the result: UNHOUSED MANURE.—One acre produced 7 tuns, 6 cwt., and 8 lbs.; another acre, 7 tuns, 18 cwt., and 99 lbs. HOUSED MANURE.—One acre produced 11 tuns, 17 cwt., and 56 lbs.; another acre, 11 tuns, 12 cwt., and 20 lbs. Difference in favor of housed manure about 60 per cent. The field was then sown with wheat, and dressed in the spring with 300 lbs. of guano per acre, and yielded upon two acres, treated with unhoused manure, 84 bushels of grain and 6,864 lbs. of straw. The other part, two acres, gave 109 bushels of grain and 9,482 lbs. of straw. On the first part the wheat weighed 61½ lbs. per bushel, and on the other, 66 lbs.

1033. **Immense Value of Manures Used in England.**—The value of manure annually used in England is estimated, from statistics carefully collected, at the enormous sum of $300,000,000. In making this calculation, all the home-made manures are put down at their commercial value, and all the imported bones, guanos, and other fertilizers, at the prices paid for them by the farmers. Is such high manuring profitable? That is the test question. It is the one that has governed English farmers—no other would be sufficient to cause them to use such an immense sum annually in manures. It is simply a commercial operation, based upon this question: "How much manure is my manufactory (the farm) capable of working up this year?"

1034. **Value of Particular Manures on Wheat.**—The following table shows the result of experiments made by Dr. Voelcker, at Cirencester, England, with fertilizers for wheat. The manures were all in fine powder, mixed with ten times their weight of soil, sown broadcast upon the growing crop March 22, and washed in evenly by a gentle rain.

No. of Plots.	Manures used, and Quantity per acre.	Yield of Wheat per acre in bus.	Yield of Straw per acre in lbs.	Increase of Wheat over unman'd plot.	Inc. of Straw over unma. do.
1	No manure	27	1,984	... bus.	.... lbs.
2	280 lbs. Peruvian guano	40 1-10	2,576	13 1-10	592
3	195 lbs. nitrate of soda	38	2,696	11	712
4	180 lbs. nitrate of soda and 168 lbs. common salt	40 6-10	2,736	13 6-10	752
5	448 lbs. Proctor's wheat manure	39½	2,668	12½	684
6	672 lbs. " " "	44 1-5	3,032	17 1-5	1,048
7	4 tuns chalk-marl	27	1,872	None.	112 dec.

The manures cost $7 80 per acre, except the large dose of Proctor's wheat manure on plot 6, which cost $11 70.

The wheat was worth $1 26 per bushel. Leaving the value of the straw out of the question, the profit from the use of the top-dressing was: With guano, $8 70 per acre; with nitrate of soda, $6 per acre; with nitrate of soda and salt, $9 33 per acre; with 448 lbs. wheat manure, $7 95 per acre; with 672 lbs. wheat manure, $13 87 per acre.

Taking the first four lots, where the same amount of money was expended on each lot for manure, the nitrate of soda and salt give the best result, guano next, the wheat manure next, and the nitrate of soda alone, the least. The extra heavy dose of wheat manure gave the largest profits, although the increase is not quite in proportion to the amount of manure; that is to say, the extra 224 pounds on plot 6 gave an increase of about five bushels, while the 448 pounds on plot 5 gave an increase of 12½ bushels. The cost of producing an extra bushel of wheat was: With guano, 60 cents; with nitrate of soda, 71 cents; with nitrate of soda and salt, 57 cents; with 448 pounds wheat manure, 62 cents; with 672 pounds wheat manure, 45 cents.

In these calculations we have allowed nothing for any effect which the manures may produce on the next year's crop. As a general rule, the effect of such manure the following year is very slight, especially if the land is sown with any of the cereals. On clover, the mineral manure left in the soil sometimes proves beneficial. This is in accordance with theory, and agrees with the experience of farmers who use guano on the poor soils in Maryland and Virginia.

1035. **Value of Particular Manures on Oats.**—Joseph Harris, editor of the *Genesee Farmer*, Rochester, N. Y., sowed oats May 20, on clover sod, and May 26, just as they were coming up, top-dressed the land with the following manures per acre: No. 1, no manure; No. 2, 600 lbs. of plaster; No. 3, 300 lbs. superphosphate of lime; No. 4, 300 lbs. sulphate of ammonia; No. 5, 300 lbs. superphosphate of lime and 300 lbs. of sulphate of ammonia. The result was as follows:

	Straw per acre.	Grain per acre.	Bus. per acre.	Weight per bus.	Total straw & grain.
No. 1	1,958 lbs.	792	36	22	2,750
No. 2	2,475 "	1,225	47	26	3,700
No. 3	2,475 "	1,050	50	21	3,525
No. 4	2,750 "	1,100	50	22	3,850
No. 5	2,575 "	1,150	51	22½	3,725

The most striking result is the effect of plaster (gypsum or sulphate of lime) on the quality of the grain. The oats on all the plots, owing to the late seeding, were very light, but where the plaster was used, they were 4 lbs. per bushel heavier than on the unmanured land. In addition to this, there was an increase of 11 bushels of oats and 950 lbs. of straw per acre from the use of plaster. Mr. Harris has since obtained a similar result by the use of plaster on Chinese cane.

1036. **The Use of Salt as a Fertilizer.**—Salt has long been used in Enland, with most beneficial results, applied in all quantities, from three to twenty bushels per acre. An article before us, from an English farmer, says he applies it as a top-dressing to all his grain crops by sowing it broadcast in April or May, at the rate of four bushels per acre, taking care to do it after sunset. He has found this application an excellent remedy for the grub and wire worm. He gets a much heavier crop of wheat from the salted than the unsalted soil, and finds that he not only obtained a bolder, brighter, and heavier sample, but the crop is entirely free from rust, blight, and smut in that portion of his farm where salt has been used, at the rate of from seven to ten bushels per acre, sown broadcast as long before the planting as circumstances will permit, in order that the salt may in the different workings of the land get thoroughly incorporated with the soil, and he finds that grubs and wire-worms avoid land treated in this way.

A correspondent of the *Maine Farmer* gives the following experiments in the use of salt. He says he put on six bushels to the acre, and harrowed it in before sowing his grain and grass seed. "That is the very secret why I get so much hay. I have used salt many years on corn, putting it on the hill before hoeing, as we do ashes. Upon one piece, I put ashes on one third, on one third, plaster, and on the other third, salt, and the salted portion was decidedly the best. I broke up two thirds of an acre of poor land, and not having any common stable manure to put on it, I sowed, after harrowing over once, eight bushels of salt, and harrowed it in and planted potatoes and peas. They came up as strong and grew as rank as they would have done had there been a heavy coat of dressing plowed in." There is one peculiar feature in the effects of salt when put into the ground—it serves to make the ground very light and mellow.

The following are opinions of Prof. S. W. Johnson, of Yale College, upon the use of salt. The constituents of salt are chlorine and sodium, which are ingredients of all cultivated plants. The use of salt has often doubled the amount of a crop. The growth of sugar plants and tobacco is much increased by it, though it is said to injure the quality of tobacco. Asparagus will bear a large dressing of salt. Root crops are also benefited by it. It makes the straw of grain stronger, and is beneficial to all crops in drouth. One of the benefits of salt is to make inert potash and ammonia existing in the soil available to growing plants.

In our own practice, we have used salt with decided success upon a loamy soil, in a gneiss rock formation, not many miles inland. It was highly beneficial in restoring vigor to old grass sod, and was apparently very beneficial to all farm and garden crops, except the *cucurbita* family. To that, salt is injurious.

1037. **Chandlers' Greaves and Value of Hair for Manure.**—Analysis proves that chandlers' greaves are valuable manure, as it shows that they contain thirteen per cent. of ammonia, or—what is the same thing practically—nitrogen enough to yield that amount of ammonia to the soil. The best way to employ them would probably be to break fine, soak in cold water, and spread them in a compost heap. Their value may be calculated upon the cost by estimating the ammonia they would yield at 14 cents a pound; that is, 13 per cent. 260 lbs., 14 cents. a lb., $36 40, besides other ingredients. In addition to this value, they may be fed to pigs and poultry, without lessening their worth for manure, while they are frequently worth all they cost for feeding purposes. It is proper to observe that the flesh of poultry, and also the eggs, while fed upon greaves, have a rank, unpleasant flavor. Their great value is for manure, and for this purpose English farmers have bought up great quantities in New York. In the autumn of 1862, their orders kept the market quite bare, though, owing to the receipt of 50,000 hogs a week, and 5,000 bullocks and 10,000 sheep, the quantity manufactured was larger than ever before. The average price was $25 a tun, at which they are cheap manure. Of the value of hair for manure, we can say that we have used a good many loads of the refuse of a glue manufactory, composed mostly of hair, and found it a most valuable manure. A farmer inquires: "What is the best manure for celery?" We answer, hair; it surpasses all other fertilizers. The waste of farriers, cloth-dressers, glue-makers, tanners, and all other trades, where hair or wool forms the bulk of the waste, is worth ten times as much as stable manure. The sweepings of New York barber shops have been found very valuable, and in our opinion there is no substance saved upon the farm for manure, that would pay so great a profit upon the labor, as in preserving all the hair combed from live animals, or scraped from dead ones, feathers included. It is worth an average of six to ten cents a pound for manure.

1038. **Can Worn-out Lands be Restored?**—We answer, Yes, certainly; but not by the common prescription of "rest:" that is, to be thrown out of cultivation, as they always are at the South, and as they frequently are at the North. By no rest, such as land gets when allowed to grow up in old field pines and sedge grass; or in sumac bushes, mullens, and briers, will it ever be restored. It may be by continued cultivation, deep plowing, proper manuring, and growing clover. That is the way to rest and restore worn-out lands. Some fields are called worn-out, and are really unproductive, though lacking a single ingredient of fertility. If worn out so that wheat fails, add bone-dust; if exhausted of potash, you can not grow plants that contain a large amount of that salt, until you restore potash to the soil by an application of some fertilizer in which it exists. Think, if there is no lime you can not grow the cereals until you give lime to the soil. If your land is deficient in chlorid of sodium, as almost all the old fields of New England are, think how easy to restore it by a dressing of common salt. Think, that whatever the condition of the surface, the productiveness of the land depends greatly on the nature of the subsoil. If that is cold, wet, and poor, all efforts to improve the soil will be labor in vain, unless recourse is first had to underdraining. And finally, let it be your constant thought, that nearly all lands naturally fertile soon lose their fertility by growing successive grain crops on them, unless the organic elements abstracted by the crops are again restored to the soil in the shape of manures.

1039. **Water as Manure—the Worth of Water.**—Without water all manure is worthless. With it in abundance, crops can be grown almost without manure. There is fertility in the water of the clearest stream. Who can calculate the worth of water? Who knows, or even thinks, what a well of water is worth? Who can tell the value of a spring? Can any one count in dollars the worth of a tiny brook that trickles down through a farm? The little brook where the horses, oxen, cows, and sheep go for their daily drink—for water that they can not live without; where the swine go in summer to cool their fat sides; where the old goose leads her young brood to teach them that water is a necessity of their life; where the old ducks and the young ones sail up and down, enjoying a listless life of nothing else to do; where even the old dog, as he runs over the fields, stops to quench his thirst and cool his panting tongue. Down at the brook! Ah, yes! down at the brook! What a charm in that word! and it speaks of the worth of water—a substance that no one can live without; a thing that if it does not naturally exist convenient to the house, the farm, the farmyard, the field, should be made so artificially. Who can tell the worth of water for irrigation? It can hardly be computed. If no water came from the clouds or the atmosphere, in rain or dew, what would our crops be worth? Look! how everything is parched up even in a little drouth of a few weeks. And oh, how man and beast suffer if for a single day deprived of water! Think of it, farmers, and dig wells, build cisterns, make reservoirs, that all may have an abundance of water. Above all other things, furnish your household with plenty of soft water, and you will have something every wash-day to show the worth of such an abundant thing in nature as water. You will have, what you should always save, the soap-suds for manure. I wish you could see, as I do from the desk where I now write, the enormous growth of a grapevine made the present summer (1862) by the use of soap-suds.

CHAPTER XIII.

IRRIGATION—DRAINING—PLOWING.

PLOWS AND OTHER FARMING TOOLS.

SECTION LIV.—IRRIGATION AND TILE DRAINING.

WE hold the following to be well-demonstrated agricultural truths:

First: That where land is worth $50 or more per acre, it is cheaper to drain wet land than to purchase a greater area.

Second: That such land *must* be drained before it can be cultivated with true economy.

Third: That one half, if not three fourths, of the arable land of the Eastern and Middle States would be improved enough to pay for drainage.

Irrigation is also a new art in American agriculture, but it is one that America can no longer afford to ignore—it should go hand in hand with drainage; and American farmers should read what it has already done for other countries, and think what it may do for this. Without irrigation, portions of Mexico would be almost uninhabitable; and in California it is of immense value, though the means employed are very rude. No country on earth, perhaps, was ever so favorably situated for irrigation as the northern portion of the United States. Notwithstanding the generally hilly surface, there are thousands of springs and rills that only need to be led by natural descents into artificial channels; and where streams do not exist, a windmill can be made to pump up water from a lower level to a reservoir on the hill, to be let down when required for the use of growing crops. Yet the matter is scarcely ever thought of, and no laws or system have ever been adopted to promote the improvement.

1040. **Irrigation—its Practice and Value in Italy.**—In Lombardy, irrigation has been in vogue for seven hundred years, and as may be observed in the spread of particular manufactures where once planted, so of irrigation, it has continued to spread over all the land capable of being brought under the system. Whole fields have been graded, as we cut down and fill up the uneven surface of a city plot, to bring the land under the level of the canals and ditches. The title of all running streams in the Lombardo-Venetian kingdom has been reserved in the government, so as to prevent any individual monopoly of this necessity in all agricultural pursuits of that country. The right to use the water of streams for purposes of irrigation is let out to individuals under certain restrictions, and the interest of the several parties likely to be affected is adjusted by a highly educated class of hydraulic engineers, no one of whom is allowed to assume the duties or practice the profession unless he is a regular graduate of the University of Turin. There is a government corps of engineers, and those who practice the profession on private account. It requires the highest degree of skill to construct the interminable system of canals in Lombardy, and to gauge all their capacity so as not to waste a gallon of water, and yet give each tract of land the exact supply stipulated for. Canals are often formed by landed proprietors without any immediate prospect of benefit; they look to the ultimate advantages, and if they can by that means save their land from deterioration without getting back the first cost, they consider the outlay a profitable one. By the use of water, the capacity of the land to carry an increased number of cattle is almost inconceivable. It is estimated that the triangle included between Milan, Lodi, and Pavia, the sides of which are about twenty miles, contains 100,000 horned cattle, and as many swine, and one fourth of that number of horses. By the careful saving of animal manures, and all the *tafeu* made by a large population, the soil is kept in high condition.

The profits of irrigation may be seen by the following statement: Signor Berna made careful measurements upon land of an average quality, and found the yield of grass per acre as follows: First cutting in February, 84 cwt.; second cutting in March and April, 126 cwt.; third cutting in April and May, 131¼ cwt.; fourth cutting in May to July, 73½ cwt.; fifth cutting from July to September 15, 63 cwt. Total, 477¾ cwt., or nearly 24 tuns.

In the vicinity of Milan, where it is probable they enjoy the advantage of sewerage water, the marcite meadows yield fully twice this quantity. The grass is cut for soiling in November, January, March, and April; and in June, July, and August for hay; while the pasturage in autumn is rich and abundant. The gross average produce of an acre of winter meadow is estimated at $75, when the grass is consumed by dairy stock. Summer meadows are watered with three waterings a month from March to September, to the amount of about forty-two inches over the surface. These meadows average something over three and a half tons of hay per acre. After the land has been three years in meadow it is planted three years in rice, and averages fifty-one bushels of paddy, or eighteen bushels of cleaned rice per acre. The soil is reduced to mud, and the rice sown from March to May, and kept under water until the plant blooms in July. After that it is irrigated occasionally, and harvested in the latter part of September. The rice crop is followed by Indian corn two years, and that by wheat one year, and then it goes down to grass again.

Indian corn requires the smallest amount of water of any crop. That corresponds with the experience of this country, yet it often happens that a single watering would double the profit. It is usually watered in Lombardy once a month for six months, and yields about fifty bushels to an acre. The water sufficient for Indian corn costs about 75 cents or 80 cents an acre, and owing to the dry, calcareous soils of Italy, which are ill calculated to produce grass or Indian corn, and with the wretched plows that are common, and the bad system of tillage, the population of the irrigated districts would starve if they were cut off from the usual supply of water.

1041. **Irrigation in Piedmont.**—In Piedmont two thirds of the land before it was irrigated was nearly barren. Now it yields fine grain crops. The *marcite* fields, or winter meadows, are highly manured, and then supplied with an enormous quantity of water, the purer the better; that from springs being preferred. These fields are continually flooded from the 8th of September to the 25th of March with one cubic foot per second, or 390 tuns of water daily, for three acres of marcite. The average cost of water for a winter meadow is $5 per acre. The extent of irrigated land in the valley of the Po, Piedmont, and Lombardy is not less than 1,600,000 acres. The great volume of the water is applied to the fields in grass and rice; corn, flax, and wheat do not require as much. The water comes principally from the melting snow of the Alps, so that it can not be said to contain any special fertilizing quality. The great source of fertility comes from the increased number of domestic animals that can be kept upon the land, and also that the water fits their manure for the immediate use of the plants, so that nothing is lost. What has been done by irrigation in Italy may be more fully learned by studying a work published in England upon the subject, by R. Baird Smith, captain Bengal Engineers; and what has been done there may be done here; that is, millions of sterile or very unprofitably cultivated acres may be made to produce most luxuriant crops by simply furnishing the growing plants with a supply of pure water, to say nothing of the advantage of water from some of our rich muddy streams, or from the sewerage of cities, or wasted liquids of stables and farm yards.

Piedmont appears to have the oldest system of irrigation, reaching back to the fourteenth century. Both government and individual enterprise have been brought to bear upon the creation of the system. One canal, that of Caluso, on the Orca River, begun in 1556, and completed in four years, owned by the state, is a work of great magnitude, 20 miles in length, with expensive tunnels, numerous bridges, aqueducts, and expensive works of masonry, which cost $8,500 per mile, occupies 54 acres of land, and carries 366 cubic feet of water per second, watering 15,000 acres of land. The canal of Dora, 8 miles long, yields 70 cubic inches of water per second, and waters 500 acres of meadow, at a charge to those who use the water of about fifty cents an acre. The canal of Fiano, 10 miles long, gives 48 cubic feet of water per second, and waters 950 acres. Another, 5 miles long, with 12 feet per second, waters 200 acres. The canal of Sori is 44⅔ miles long, and carries 700 cubic feet per second, and waters 30,000 acres, which is at the rate of 42⅔ acres per cubic foot per second, the rice lands requiring double as much water as other lands. The charge for water is on the average about $1 80 per acre for a cubic foot of water per second. The canal of Cigliano is 20 miles long, with a branch 10 miles long and 15 to 26 feet broad, 4 feet deep, and carries 650 cubic feet of water per second, and waters 32,500 acres, equal to 50 acres per cubic foot. The price is $1 80 per acre for dry land, and double that and over for rice land. This canal is crossed by 50 bridges, and has 13 aqueducts. The Canal del Rotto, begun in the year 1400, is 8 miles long, and discharges 600 cubic feet per second, and waters 25,000 acres, giving 55 acres for a cubic foot per second. These are only a few of the many canals of irrigation in Piedmont and Lombardy, where the system is more perfect than in any other European country, and where the results have long been proved satisfactorily profitable.

1042. **Irrigation in Germany.**—In Germany, some of the best talent of the country has been devoted to this subject, and irrigation has been adopted with the most beneficial results. Thaer lays down the position, that irrigation is one of the most useful and important of all the operations of the farmer, because moisture is essential to all vegetable growth, and from all the information that he could gather from practice, observation, and study, he felt bound to urge the practice of irrigation upon his countrymen. Experiments made in Germany since the time of Thaer have fully proved the value of water, independent of all fertilizing substances it might contain. It has been well proved in Germany, where experiments have been most carefully conducted, that irrigation doubles the average crop of hay, taking a series of years, and that the nutritious value of the hay from an irrigated meadow is quite equal to the hay from the same land before irrigation was adopted; and where the water has been drawn from fountains rich in vegetable and mineral fertilizers, the irrigated land has required no manure.

1043. **Irrigation in France, Belgium, and other Countries.**—Much attention has been given to the subject of irrigation in France, and several years after it had been practiced to a large extent, a writer calculated that there were still more than ten millions of acres of land in the empire, the product of which could be tripled annually by irrigation. If that is true of France, how much more is it true of America?

In Belgium, lands that had long lain arid and worthless, have been made to produce two or three tuns of hay per acre, by means of irrigation, and the value of estates vastly enhanced.

In France, land has been increased in value two and a half times, in large tracts subjected to irrigation. In some places expensive canals have been built, for the purpose of letting the water at fixed rents to farmers, just as it is in California to gold miners. Expensive artesian wells have also been bored in France, to obtain irrigating water, and this is also true to some extent in California. In France, Belgium, and Italy, the exact quantity required for each particular kind of soil, at each season of the year, has been carefully ascertained, so that it can be told to a degree of exactness how many acres a canal of given dimensions will irrigate. But none of the European calculations could be relied upon for America, so much depends upon the rate of evaporation. Irrigation was common in the Roman empire; and we know how much it was depended upon in Syria and Egypt; and China has accounts of it at a period anterior to Jewish history; and at the present time, throughout Persia, Syria, Egypt, and other countries, it is the farmer's main dependence; and so it was in Peru, long before America was discovered by the Europeans, for the Spanish conquerors found a most elaborate system of irrigation, under suitable regulations of law and competent engineers; just such a system as we must have here before irrigation can be practiced with general success.

1044. **Irrigation in America.**—Although irrigation is not generally adopted in this country, there have been experiments enough tried to prove that all drained land, which water would not make cold and sour, would be benefited by irrigation. California farmers, and a few on the Atlantic coast, have learned its value. Mr. C. L. Metcalf, of Franklin, Massachusetts, by his own experience, has become an earnest advocate of irrigation. With him the effect has been highly advantageous to both clover and grass—red-top and timothy. His practice is to let on the water two days and shut it off two, through April and May, and if the ground is dry, also in June.

Hon. A. B. Dickenson, of Hornby, New York, is not only in favor of irrigation, but of using the water as a means of conveying manurial substances to the field, and he has derived great advantage from simply making the water muddy, by plowing through a pond, the water of which was then spread over grass fields. He believes that the purest water that runs contains some fertility, and it certainly assists the vegetation upon irrigated land, to assimilate matters in the soil which they could not without the aid of its dissolving power. He has also proved that water long exposed to the air and warmed in the sun had a better effect upon vegetation than water from wells; partly owing to temperature, and partly to vegetable and mineral matters held in solution, all of which, except iron, appear to be beneficial. Economy in irrigation must be studied. One farmer, who wished to carry water across a valley for irrigating purposes, built a stone fence, of the right height, level on the top, and formed it into a trough, with rubble and cement, thus making one wall answer two purposes. From necessity in California, irrigation has already been inaugurated, though without a proper economical system, laws, and scientific rules; but it is probable that necessity will in time produce all these, and then the system having become once rooted in American soil, will spread all over the land, and that some of those who may read what we have said to encourage its adoption, will live long enough to see the system successfully practiced, to the lasting advantage of the great brotherhood of American farmers.

One of the American objections to irrigation is based upon the interference of the conduits with the mowing machine. It is contended that numerous trenches in the face of a field, ten or twelve inches deep and only half that width, and these necessarily crooked, to conform to the level, would seriously inconvenience the mowers. There is some force in this objection, but it is not insuperable. Where a surface is thus intersected by irrigating conduits, plant white stakes in them to indicate every turn, and then follow their course with the machine; and even though it is a little more trouble to cut the grass, the increased production will furnish compensation.

1045. **What Lands are Most Benefited by Irrigation.**—Even sandy soils, apparently destitute of humus, have been made to produce hay crops by irrigation. But in such land, unless the supply of water is abundant, it will be necessary to construct the irrigating trenches with a view to save water. This may be done by puddling the trench with clay, or conveying water in pipes. It is quite important to get as even a distribution of water over the surface as possible, and see that it nowhere stands in pools, as that will surely spoil the grass, and produce damage instead of benefit. Let it be remembered that irrigation will not make poor land rich, and unless fertilizing substances are conveyed to the land in the water, it will do that land the most good that is furnished with the most manure. Irrigation should never be attempted upon land that is nearly level, as it will be likely to afford no commensurate advantage, unless it is so situated that a flow can be given to it of water rich in humus, at a time when the grass will not be injured by water standing upon its roots. Of course there are many farms that can not be irrigated for want of water; and there are others that have water but no land that can be used, because the lowest portion is too level and the higher parts too hilly. So we do not recommend irrigation as a general panacea to all farmers; but we do urge it upon the attention of many, as the best and most economical way of restoring their land to fertility. As to the quantity of water necessary for successful irrigation, that depends upon such a variety of circumstances that no definite rule can be given. In one case in Germany, where the upper stratum was fine sand, and gravelly clay in part, for the lower one, with a gentle slope to the surface, so that the water was used over and over upon sixty acres, it was found by twenty years' experience that the quantity of water was 200,000 cubic feet for twenty-four hours' irrigation. It was found, also, that the best time to commence watering was about the first of April, keeping on two to four days and then off the same length of time, till the grass is ready to cut. Repeat the operation for aftermath, and then keep the water off, because late watering proved prejudicial. Irrigation has changed arid wastes, inhabited by a sparse, poverty-stricken population, into well-cultivated districts, supporting a dense and wealthy population, and the same result would be produced in many places in this country, by the same enlightened system that prevails in Italy, where all kinds of cultivation are benefited far above the cost of the water, and grass lands are made to afford crops that could not otherwise be obtained, and this enables proprietors to keep many more cattle, increases the food crops, and enables the country to support a population that could not possibly exist upon the land if deprived of irrigation.

1046. **Quantity of Water Required for Irrigation.**—It is estimated that an irrigated meadow will absorb, by soaking in or evaporation, nineteen-twentieths of the water let on, before it would find its way off by natural drainage, unless the slope was very steep, or surface very hard gravel or clay. A main conductor of water, twelve feet wide on the surface, four feet wide at bottom, and four feet deep, may be made on a descent of two feet to the mile. Smaller ditches may be constructed on a fall of one inch in twelve feet. The irrigating conduits should be nine to twelve inches deep, and very narrow, with a fall of a fourth of an inch to twelve to twenty feet. Irrigation can be conducted upon steep declivities, but the preparation is more expensive, as care must be taken to conduct the water so that the conduits will not overflow and let the water course down the hill uncontrolled. The cost of preparing the surface of a meadow for irrigation, after the water is brought to the border on the highest part, would probably be in this country of high-priced labor from six to twelve dollars an acre.

Where water is elevated by any power for irrigating purposes, we recommend the construction of a reservoir sufficient to give several days' supply, to obviate the danger of a failure in the elevating power at a time when the crop, having been watered for some time, would be greatly injured by having the supply cut off. Great care must be used in regulating the quantity of water, which can only be determined by experiment, so as not to flood the land and sour the herbage, or give fitful waterings—a flood to-day and drouth to-morrow. We have untold acres of land so situated that it can be irrigated by the natural descent of the water, but in many instances the owner of one field could not avail himself of the advantage without the consent of the owner of an adjoining field, unless we had some general system by which the right could be obtained, as is the right to flow land for milling purposes, or to take it for public roads. There are a great many farms in hilly countries, without running streams in summer for irrigation, which have the means of storing up water in reservoirs, cheaply formed, to be let down over the fields and save crops from destruction in times of drouth. Windmills could also be used for irrigation. We see one in almost daily operation at a manufactory, which did not cost over one hundred dollars, which would be sufficient to store up water enough in a cistern upon a neighboring hill to irrigate a hundred acres. See 369. Any field that has a moderate descent can be irrigated by open ditches and made to pay a greater interest upon the cost than any other farm improvement ever made.

1047. **Tile-Draining—its Importance and Advantages.**—Though we have said so much in favor of irrigation, we may say more in favor of under-draining, because it can be practiced where irrigation can not; and when the two systems can be connected, they will mutually benefit each other. Instead, however, of giving detailed rules about draining, we will simply refer the reader to an American work upon the subject, published by Hon. Henry F. French, of Exeter, N. H. Tucker's *Annual Register*, for 1859, also contains much information about draining. No one should expect to succeed in a work that requires so much scientific skill, without previous instruction from an experienced person, or from books and diagrams and sound judgment applied to the work. The point upon which inexperienced persons are most apt to fail is in the course of drains, which should always be laid up and down the descent, and never less than three feet deep, if the outlet fall will admit. Still better for the land and drains if laid five feet deep. At this depth, wooden drains will last, nobody can tell how long, for except near the outlet they are almost indestructible. One of the greatest benefits of underdraining is, it deepens the soil. This has been proved upon the hardest kind of red sand-stone land; the aëration of the subsoil from the open tile-drains, after the water leached off, had the same effect upon the hard pan that air has upon lime. Heavy lands are always so saturated with water that the productive soil must be naturally thin, and this is why deep plowing and the use of a subsoil lifter will double the depth of the productiveness of such land, and why underdraining will quadruple it. Deep plowing and underdraining are the farmer's cheapest manure, and the profit of the work is in the time gained in putting in spring crops, which is worth more annually than the interest upon all cost of underdraining. No matter what is the character of the soil, it will be benefited by underdraining; but mostly those soils in which water stagnates, or which have no outlets for rains, except by evaporation. But all soils can not be profitably underdrained, because the land must have an intrinsic value much above the ordinary price of Western farms, or even some of the interior land of New England, before it will pay to drain it. A great many swamps may be profitably drained, because utterly worthless as they now are.

1048. **What Land Should be Drained.**—Rain-water falls on hills, sinks to an impervious stratum, along which it runs until it either finds a porous section through which it can fall to a lower level, or not finding such, continues on the hard bottom to the side of the hill, where it oozes out in the form of a spring. If this spring-water is suffered to run down hill, it washes the hill-side more or less, and coming to the lowland, sinks as far as it may into the soil, makes it sodden, and produces bad effects. To drain effectually, then, we must cut off the supply above, and fewer drains will be necessary below. It is the hill lands then, as a general thing, that first need draining. Enough water falls in one hard rain to cover the land three inches deep, and this saturates a clayey soil, and remains often until another rain falls. All such land should be drained. John Johnston, of Geneva, N. Y., the original tile-drainer in this country, does not think there are a hundred acres in any neighborhood that do not need draining, and would not pay well for it. Perhaps this may be thought an extreme assertion, but it is nearer the fact than most of us have been aware. His first purchase was one hundred and twelve acres of land, well situated, but said to be the poorest in the county. The soil was a heavy, gravelly clay, with a tenacious clay subsoil, a perfectly tight reservoir for water, cold, hard-baked, and cropped down to about the last gasp. In 1835 tiles were not made in this country, so Mr. Johnston imported some as samples, and a quantity of the "horse-shoe" pattern were made in 1838, at Waterloo, N. Y. There was no machine for producing them, so they were made by hand and molded over a stick, at great cost. Yet he found draining profitable, and now he thinks, at the present cost of tiles, the increase of crops will pay the cost of draining in two years. In 1847 he drained a quagmire, so that it produced eighty bushels of corn per acre in 1848, and in that case the cost of draining was paid by the increase of one crop. The late John Delafield drained a piece of land that would only yield ten bushels of corn, at a cost of thirty-six dollars an acre, and the yield was increased to over eighty-three bushels per acre on the whole field, and ninety-four bushels upon the best part. The average cost of under-draining in France has been ascertained to be twenty-seven dollars an acre, and the increased value of annual products nine dollars an acre. Under-draining is advantageous in saving the elements of fertility in land from washing away. A French writer says that six thousand cubic yards of the water of the Vaucluse or the Vosges contain all the elements of an ox, and that the Garonne carries out to sea every day more guano than is imported into France in a year.

1049. **How Land Should be Drained.**—Upon land that is nearly level, the first step is to have it carefully leveled. Ascertain first where the outlet of all the water must be, and whether you can have one or more main drains, with branches leading in at nearly right angles, or whether you must make all the drains from the farther side, each to empty its own water into a natural brook or artificial ditch. If the drain is very long, you must use large tile at the lower end. If the descent of a drain is small, say only one inch in a hundred feet, it will require tile of twice the diameter of a drain of rapid descent, say one inch in twelve. In many cases Mr. Johnston has used two rows of four-inch, in others six-inch, and in one, a pipe nine inches bore. At first he had many to take up and replace with large pipe to secure a complete discharge. Main drains he makes six to eight inches deeper than those emptying into them, which are graded so that the descent may take place gradually, and always with a slight sidewise direction down stream. Although he uses large mains, he recommends farmers never to use laterals over two inches in diameter, and often one inch will be quite sufficient. No one can give directions for size of tiles. They must be adopted to circumstances. Let the rule be small laterals and large mains. If your land is wet, you will require large pipe, and if flat, the lines must be near together; say 30 feet apart. Both ends of the drain should be open to the air, and, as tile are destructible by frost, make the outlet of stone, brick, or wood, and make an air-vent at the upper end by a pile of loose stone, a box, or a hole through a log, with such a mark at the surface as will enable the plowman to avoid disturbance. This will not only make the water run more freely, but the air will draw through and aerate the soil. Sometimes tile become obstructed, and must be taken up at the point of difficulty, which is easily determined by the water coming to the surface. But stoppages are not frequent—not half as frequent as it is to find good, durable streams of water running from the drains, which in some cases have proved valuable sources of stock water for the farm, where it was previously very destitute.

1050. **Laying off the Ground, Ditching, and Laying the Tile.**—A spirit level, mounted upon a tripod, is most convenient, but a rafter level will answer, and can be home-made, with a plumb-bob from the apex to indicate degrees of descent upon the cross-bar. To get your scale, make the legs of your triangle exactly twelve feet apart. Set it up on a level (ice is best of all places), and put an inch block under one leg, and mark 1 where the line hangs, and so on, 2, 3, 4, 5, 6, as you raise the leg inch by inch, and then when you set the instrument upon land, the plumb will show the number of inches descent in each twelve feet almost as fast as you can walk. In digging a ditch for a tile drain, no more dirt is to be removed than is barely necessary to do the work and afford room for the tile at the bottom. To do this, a few tools not usually found on a farm must be had. That is, a long, narrow, blade-spade to cut the bottom of the ditch ; a light pick with a long handle to dig where the earth is too hard for the spade ; a long-handled scoop to take out the loose earth. This is like a narrow hoe with the edges turned up. A spoon shovel, with a long handle, is sometimes convenient, particularly in taking out pebbles. If we were ditching a meadow, we would first plow two furrows, turning the sod carefully each way. To do this well, the second sod must be cut deeper than the first, or else the plow must have an attachment on the land side, like a knife-blade, projecting down to hold it up to the edge of the turf to be turned. The earth may be loosened two feet by this sod furrow, followed by a subsoil plow. It is then quickly shoveled out, and where it is to be dug deep, it may be found useful to cut the lower part so much narrower that a shoulder will be formed at this point, upon which the ditcher can stand. Tiles are easily laid at the bottom of a deep ditch by a tile-hook, which is simply a slim piece of iron fixed at right angles to the bottom of a slender handle. As one man lays them down, another throws a little loose earth in, which is rammed down to keep them straight and firmly in place. Then cover with straw, weeds, bulrushes, small brush, inverted turf, or coarse gravel, to prevent the fine earth running into and choking the joints. It is not necessary to fill the ditch with anything but the dirt that came out, to enable rain water to find its way in. It will find its way through hard earth from a point twenty feet distant.

1051. **Descent and Depth Necessary in Drains.**—It is common to hear the remark, that such a piece of land can not be drained, because it is too level. As we do not believe in level land, we ask you to try the level before you decide. Again, it is surprising to see how little fall is necessary to make water run. Two inches fall in 100 feet of well-made drain has been found entirely sufficient. We know that water in rivers runs with a fall of two inches in a mile. With a descent of six inches per mile, a stream runs a mile per hour. As to the depth of drains, that, too, depends upon circumstances. We believe four feet is right. Where tiles are dear and labor cheap, the less tiles we can use the better. Drains three feet deep, at forty feet apart, are not so effective as at five feet deep and fifty feet apart. Tiles in this country must be laid below frost and subsoil plows, and that should be at least three feet deep. Nobody contends now in England for less than three feet depth of drains, and those who advocate three feet are called shallow drainers. As a general rule, it costs as much to dig the fourth foot as it does the other three feet. A four-foot drain is opened in England only one foot wide at the top, and just wide enough to lay the tile at the bottom.

1052. **What Draining does for Land.**—It not only dries the soil, but it enables it to endure drouth, because the lower strata being aerified and warmed, induces roots to penetrate it, and thus decomposition of organic matter in the soil is hastened, and nutriment formed for the growing plants. The mechanical texture being improved, the soil is thus deepened, and excess of water quicker removed after a rain. The land is more productive because the season is lengthened. Grass holds in better, and grain is not thrown out by freezing and thawing. The land is sweeter, warmer, mellower, richer, and in every way better for all purposes, and healthier. Indeed, one of the great benefits of draining a country is the improvement of health. It is of great advantage upon uplands, and still greater when swamps are drained. It is particularly needed in all the cotton-growing States.

1053. **The Cost and Durability of Tiles and Tile-Draining.**—It has been estimated that the average price of two-inch pipe tile is about $1 67 a rod at the manufactory. Such as was made and used in this country eighteen years ago, by John Johnston, of Geneva, New York, he reports as sound as the day they were put down. Tiles should be about as well burnt as good wall brick. They are then strong enough, and can be cut, and are not likely to break in the earth. They should be hard enough not to dissolve, and the clay should be compressed sufficiently to make the tile strong enough, without such hard burning as will melt the clay. The following were the advertised prices in 1861–2:

HORSE-SHOE TILE.

	At Hartford, Ct.	At Albany, N. Y.		At Hartford, Ct.	At Albany, N. Y.
$7\frac{1}{2}$ inch caliber..	$——	$75 00 per 1000	$4\frac{1}{2}$ inch caliber..	$18 per 1000..	$18 00 per 1000
$6\frac{1}{2}$ inch caliber..	——	55 00 per 1000	$3\frac{1}{2}$ inch caliber..	15 per 1000..	15 00 per 1000
$5\frac{1}{2}$ inch caliber..	40 per 1000..	35 00 per 1000	$2\frac{1}{2}$ inch caliber..	12 per 1000..	10 75 per 1000

SOLE TILE (EGG-SHAPED CALIBER.)

6 inch caliber..	$150 per 1000..	$80 00 per 1000	2 inch caliber....	$12 per 1000	$10 75 per 1000
4 inch caliber..	40 per 1000..	35 00 per 1000	Round tile $1\frac{1}{4}$ inch caliber.....		9 00 per 1000
3 inch caliber..	18 per 1000..	16 25 per 1000	Round tile $2\frac{1}{4}$ inch caliber.....		12 00 per 1000

To estimate the number of tile required for an acre, divide 43,560 by the number of feet your drains are to be apart. As that is the number of superficial feet in an acre, if your drains are to be 36 feet apart, then 43,560 divided by 36 gives 1,210 as the quotient. Always calculate one tile for every foot in length, to allow for breakage, and then you can easily ascertain the cost of any given line of draining. Upon one farm in New York, that of R. G. Swan, near Geneva, there are over sixty miles of tile-drain, a considerable portion of which cost only $28\frac{1}{2}$ cents a rod, complete. The cost of digging and filling ditches upon Judge French's farm, Exe er, N. H., where the earth was so hard it had to be picked up, was for one job of a mile of ditches, four feet deep, a day's work to three rods. Upon another job, with ditches four feet deep, and twenty inches wide at top, and four inches wide at bottom, giving a mean of twelve inches, two men opened 14 rods of such ditch in a day, and in six days, opened, laid the tiles, and filled $57\frac{1}{2}$ rods; at a cost of 21 cents a rod for labor, at $1 a day. The total cost was: 847 two-inch tile at $13 a thousand, $11 01; 100 three-inch tile, $2 50; tan bark on joints, 70 cents, horse work, 50 cents, $1 20; labor, 12 days, $12. Total, $26 71. This is $46\frac{1}{2}$ cents a rod, besides engineering and superintendence. The soil was sandy. In hard clay soil, it cost 50 cents a rod for the labor, which was done by the same hands as the others. Drains three feet deep cost only half as much labor. This is true on the average, and where the land is stony, the last foot will cost more than equal the cost of the first three feet. Where labor is hired by the day at one dollar, it may be calculated that the cost of digging and filling in ditches four feet deep, including placing the tiles, will average $33\frac{1}{3}$ cents per rod. If tiles cost one cent a foot, then the total cost will be 50 cents a rod; and per acre, according to the distance apart of drains. The following table gives the number of rods in an acre at the several numbers of feet apart, of the drains, to wit: At 15 feet, 176 rods; at 18 feet, $146\frac{2}{3}$ rods; at 21 feet, $125\frac{5}{7}$ rods; at 24 feet, 110 rods; at 27 feet, $97\frac{7}{9}$ rods; at 30 feet, 88 rods; at 33 feet, 80 rods; at 36 feet, $73\frac{1}{3}$ rods; at 39 feet, $67\frac{9}{13}$ rods; at 42 feet, $62\frac{6}{7}$ rods. Thus, the cost of draining an acre with tiles at one cent a foot, and labor two cents a foot, with drains at 30 feet apart, will be $44; at 42 feet apart, $31 42; at 60 feet, apart, $22.

1054. **Wooden Drain Tubes.**—S. P. G., of Racine, Wisconsin, says wooden tubes, with perforations through the sides, loosely jointed, will answer all purposes of tile, will last as long in places where they are constantly wet, and can be laid for half the expense. This may be true if the pipes are placed very deep in the earth, never less than four feet, and it would be better if five feet. These pipes are made of three-inch scantling, bored very rapidly by machinery, with an inch-and-a-half auger; and we recommend that they should be slit in two after being bored, and the halves mismatched, in every two pipes, so as to be sure that they do not fit together tight enough when laid to prevent the water finding its way inside.

1055. **Brush Drains, and Substitutes for Tile.**—We have seen common sapling pine poles last long enough to pay the cost four times over; the drain being formed of three poles—two an inch or two apart at bottom, and one on top. This only answers in land not liable to gulley out in the bottom of the drain. We have seen valuable service done with bush drains. Long, slim bushes are jammed down in a narrow ditch, with buts lapping on the tops, and always pointing up hill. We have heard of such a drain made of cornstalks that lasted six years, and was still good, and had paid its cost every year it was in use. Very durable drains have been made of cedar, both round and split; and chestnut rails have also been profitably used.

Wood will always be found most durable in the wettest drains. We have heard of a drain laid through quicksand, by placing a board at bottom and on it two pieces of scantling and a flat slab, all of which were continually wet, which will apparently last forever. Wooden drains, however, we can not recommend for any place where stone or tile can be obtained.

1056. **Cobble-Stone Drains.**—The loose cobble-stone of many farms can be formed into a very good drain by careful labor, placing one each side and a larger one resting on the two, leaving a passage underneath, and filling in promiscuously to within plow-reaching distance from the top. With good wall-building stones an excellent drain can be made. But the objection to all stone drains is the extra labor over that with tiles, so that they can only be recommended in places where it is an object to get rid of the stones. Judge French estimates the extra cost of labor to lay stone drains, even where the stones are on the farm, at more than the cost of tiles.

1057. **Cement Drain-Tiles.**—Good drain-tiles have been made of cement and sand, at first porous, and afterward not so, dependence being made upon having the water enter the joints. As to the water going through the pores of the tile, ten times as much goes through the joints as through the pores, so that making them porous is not so very important. The joints will take in all the water in the ground. In some places these cement tiles can be made on the farm cheaper than terra-cotta tiles can be obtained.

1058. **A Prairie Draining-Plow.**—A machine is in use in Illinois that answers a good purpose in draining the ordinary soil. A strong beam, on four rollers, carries a small cutting wheel, which divides the sod; this is followed by a sharp coulter, set at an angle backward, to the bottom end of which a piece of iron, shaped something like a pear, is welded, supported by a flat bar, bolted, like the coulter, fast to the beam. To this "mole" is attached a second, of similar shape, a little larger, by a link joint. Being set into the ground, it opens a hole, which it molds permanently by side pressure, three feet below the surface, and through this drain the water runs off as easily and continuously as through tile-drains. Farmers consider it invaluable on our large prairies, in the broad, flat sloughs; as they say, that it not only thoroughly drains the land, but that it concentrates the underdraining of the marshes and sloughs to any particular point that it may be wanted, creating a permanent, never-failing spring of water for stock, on many farms where this convenience was totally lacking, in dry seasons, until the introduction of the ditcher.

Many sloughs have been drained by running the mole-plow through them, and down the outlet or lowest spot, until the natural fall will allow the water to come to the surface, and there a durable spring is often formed.

1059. **Proper Shape of Drain-Tile.**—The Royal Scottish Society of Arts publish experiments in transporting lead ore from the mines to the stamping mills, by water, running through a trough. At first they tried a square wooden trough, twelve hundred feet long, with a slope of from thirteen to twenty degrees; but the water had not force enough to move the lumps of ore over the flat bottom of the trough. They then changed the position of the trough, having it rest on one corner, and the ore passed rapidly through without choking. A right-angle form kept itself clear with the least water. According to this theory, the proper shape of drain-tile is not round, but should be shaped with a sharp corner in the lower side of the pipe.

1060. **Laws Needed to Regulate Draining.**—Every State should regulate the drainage of land by statute, so that those who hold the mouths of natural outlets for water can not deprive others of their use who own land farther up stream. Such a law was passed by Maine, in April, 1859, providing that any one in possession of lands that can not be drained, approached, or used without crossing land held by another, may have drains established by commissioners who locate the route and assess the damages; and then the ditch is placed upon the same footing as to right of way and repairs as public roads.

SECTION LV.—PLOWS AND PLOWING.

WHAT is the object of plowing? It is either to turn a sod or flat furrow, or stir and mellow the surface, or break up the subsoil without bringing it up. Then there is no such thing as a universal plow. The one invented by Governor Holbrook, of Vermont, comes the nearest to it, but that in reality combines four plows in one, by shifting mold-boards and land-sides. The best plow to turn flat furrows in sod ground would be the worst one to stir up a stubble field. The plow must be fitted to the object required; but upon almost all soils you may lay it down as a rule in plowing, that you can not plow too deep nor too much. If you have disintegrated the soil until it has become so filled with air that the particles are actually held apart so that it is in a condition that you call puffy, it will be useful, and for some crops necessary, to compact the surface together with a roller, or some other mechanical means. A turnip field, after having been pulverized with great labor, is often tramped by sheep. An onion bed is first made mellow, and then compacted quite firmly. A wheat field can not be made too mellow—can not be plowed too many times—can not be harrowed and pulverized too much; but after all that, it is benefited by a heavy roller. Plowing exposes the lower stratum of soil to the ameliorating action of air, by which it acquires fertility. We can not say how, though all experience proves the statement true. Plowing is therefore necessary, and the more perfectly it loosens and pulverizes the soil, the more equally will it be penetrated, and the more numerous will be the roots sent out, until the whole soil is filled with their hair-like fibers. As a rule based upon the truth of science, it may be said that while it is possible to divide the particles of earth—that is, to separate them one from another in the same way that the grains of sand are separated—the manipulation of it will improve its condition. Farmers must continue to look to the "object of plowing," and reach down a little deeper and deeper, and bring up and separate more of the particles of the earth, so that the growing plants can appropriate them to their use, and the earth will never become barren; pulverization and water will make it produce forever, if the elements which crops extract are fairly returned in the shape of excrements of such crops when consumed.

1061. **The History of Cast-Iron Plows.**—The first cast-iron mold-board was invented by James Small, of Berwickshire, Scotland, about 1740. He continued to manufacture them for fifty years, still using the wrought-iron share; cast iron for that purpose having been first applied by Robert Ransom, of Ipswich, England, in 1785. Eighteen years afterward, he made a valuable improvement, still in use among all good plow-makers, that of chilling the iron in the molds, by using bars of cold iron, upon which the cutting edges of the share are cast, making them harder than steel. A Suffolk farmer added the land-side, making three distinct pieces of casting to each, to which wrought or cast-iron beams and handles were afterward added in various parts of England and Scotland.

The first cast-iron plow in America was made by Charles Newbold, of Burlington, N. J. His first patent bears date June 17, 1797, and is for a plow combining mold-board, share, and land-side all in one casting. Objections being made to the cast-iron share, probably because it was not chill-hardened, he substituted wrought-iron shares. Great as these improvements were upon the old wooden plows, such was the prejudice against them—some even affirming that cast iron poisoned the ground and prevented the growth of crops—that after spending, as the inventor alleged, $30,000 in a vain effort to get his plows into general use, he gave up the business in despair, leaving American farmers wedded to their idols, the old wooden plows.

In the year 1800, Peter J. Curtenas, a merchant of New York city, advertised plows for sale, made of cast iron. In 1807, David Peacock, of New Jersey, taking his idea from Newbold, for which, however, he paid him a thousand dollars, patented a plow, the mold-board and land-side cast separate, to which he attached a wrought-iron steel-edged share. Thomas Jefferson wrote a treatise, in 1798, upon the form of the mold-board, insisting that it should be constructed upon scientific principles. These principles were probably first applied by Robert Smith, of Buckingham, Pa., about 1804–6, as he obtained a patent for a cast-iron mold-board, and wrote upon the subject about that time. In 1814, years after cast-iron plows had been in successful use in England, and partially so in this country, Jethro Wood obtained a patent for a cast-iron plow, in three parts, similar to one said to have been in use previous to that time in Virginia. This was a very different article from those now in use. We do not believe that Wood ever was entitled to any credit as an inventor, though he was for his persevering efforts to get his plows into general use.

In 1817, Edwin A. Stevens, of Hoboken, N. J., took up Newbold's plow, with a view to improve its form, so as to make the draft easier. He took his patent in 1821, included in which was the process of cold-chilling the cutting edges and parts of the share most likely to wear out. His plan was so perfect that it was highly approved of, but other engagements prevented him from extending what he had so successfully begun.

In 1810, Josiah Dutcher, of New York city, commenced a series of improvements, which are to be found upon nearly all cast-iron plows, and which have been of immense benefit to the farmers of this country, notwithstanding which, we believe, he died poor, and his name is almost forgotten by those whom he has benefited so much; while those who have invented death-dealing implements, or stained them with the blood of victims immolated upon the shrine of military glory, are lauded more than the godfathers of the Industry of All Nations.

The first patent plow of which we have any record, was granted in 1720, to Joseph Foljambe, of Rotherham, England, and for many years afterward all similar plows bore the name of that place. It was a great improvement upon those previously in use; the mold-board and land-side were wood, sheathed with iron plates, the share and coulter wrought iron with steel edges, just such as were in universal use in New England early in the present century, and similar to those now in use in the Southwestern States. This plow was intended to be worked by one man and two horses—much larger than our common horses—and turn over an acre to an acre and a quarter a day. The following is the measurement of that plow: Length of beam, 6 feet; from end of handles to point of share, almost in a straight line, 7 feet 4 inches; from point to heel of land-side, 2 feet 10½ inches; hight from ground to top of beam, 1 foot 8 inches; weight, 140 lbs. Some twenty years after this plow was brought out, the center draft-rod or chain was added, just like that now used, and supposed by some to be a very recent invention.

Joel Nourse, of Boston, in connection with his partners, has probably done more toward making the cast-iron plow a perfect implement than any other individual, though many others are entitled to high praise for doing, to the extent of their ability, so much to lessen the labor of tilling the land.

The most ancient plow, as represented on old coins and monuments, was a crooked stick, afterward improved by sharpening with iron. The implement now in use in Hindostan is little better than the original, and even in this country some now in use are but slightly in advance of the Hindoo article, which consists of a slight beam, a narrow share, and a corresponding stick with a handle to guide it. The Chinese plow is similar, and the effect is what it would be if a man should hold a sharp-pointed shovel, back up, with the handle at an angle of forty-five degrees, and it should then be drawn forward with the point in the ground. The plows of continental Europe have undergone but little change for centuries. The ancient Roman plow is still in general use in France. It has a beam, a share, and a handle. The share is a triangular-shaped piece of wood with an iron point, lance-head shaped, and sometimes a coulter, and rarely a mold-board. How much better was the old "Carey Plow," which in youth we followed many a day, with its clumsy wrought-iron share, wooden land-side and standard, and wooden mold-board, plated over with a piece of tin, sheet iron, or old saw-plate, requiring the strength of a man to hold it by the two pins in its upright handles, and at least double the strength of team now needed to do the same work. Then there was the old bar-share plow—a flat bar forming the land-side, with a thick clump of iron like the half of a lance-head for the point, in the top of which the coulter was clumsily locked, and of course a wooden mold-board without any pretensions to making a fit with the iron part.

There is no longer any occasion nor excuse for a farmer's using a poor plow, nor one not fitted to his particular soil and various kinds of work; since plows of a great variety of patterns are made; right hand and left; and with shifting mold-board; so that furrows on a hill-side can all be turned one way; also with two shares on one beam; the first turning the sod and second lifting a course of loose earth from the bottom of the first furrow and placing it on top of the furrow-slice of the forward share.

1062. **Subsoil Plows—their Shape and Use.**—Of all the useful improvements in plows we consider the subsoil plow the most important. The use of this plow is to follow the turning plow, entering the bottom of the furrow and performing one of the most useful operations upon the farm, stirring and loosening up the subsoil. One of the best-shaped subsoil plows for soils free of stone was invented by Prof. Mapes, of New York. The shape of the share is somewhat like a flattened quarter of an orange-peel. Suppose this placed with the convex side up, connected with the beam by a thin, broad standard, with a flat plate at the top to bolt to the beam. The share, standard, and top plate are cast all in one piece, and when one point of the share becomes dull by use, the plate can be unscrewed from the beam and reversed, thus bringing a new point of the share forward. A Wisconsin farmer—Mr. R. North, of Rochester, Racine County—has invented a subsoil attachment to the plow, which is described as readily applied to any plow, adjustable to any required depth from an inch to six or more inches, and which thoroughly pulverizes the subsoil without raising it from its natural position. In other words, by the help of this invention, land may, by one man and one team, be at the same time surface-plowed to the full depth of the former plowing, and subsoiled to the depth of two or more inches, the pulverized subsoil retaining its original place. We saw something of this kind, made by a smith in Norfolk, Va., ten years ago, that was very effective. It was a lance-head on a rod about a foot long, bolted to the heel of the plow, and curved over so that the point stood forward, and cut four or five inches below the plow-furrow. This attachment is easily made and applied by any smith, and is a very useful addition to any plow to be used in mellow land. For stony soils, a subsoiler is made of steel, somewhat in the shape of a sharp-toed shoe, bolted to a standard in two parts, one acting as a brace when attached to the beam. This is stronger than the cast subsoiler, and better calculated to dig in among stones; and it is similar to an implement called a ditching-plow, except that the standard of the ditching-plow is sometimes four feet high, and may be regulated to suit various depths, as the ditch deepens.

1063. **Steel Plows.**—Within a few years the manufacture of steel plows has been very largely extended, the invention, not only of the plows, but machinery for their manufacture, having been brought to great perfection. One of the most extensive establishments for making steel plows is that of Remington, Markham & Co., at Ilion, N. Y. We have had this year, 1861, several acres of strong land turned by one of these plows, which is so light that the English plowman was afraid to hitch the oxen to it, he was so sure it was not strong enough. He soon changed his opinion, and declared it not only very strong, but the best plow he ever saw. We have also a steel subsoil plow for one horse, which is a very useful implement for marking rows to plant, and working between, to stir and loosen the earth, particularly in drouth. One of the great advantages which steel plows have over all others, is in weight; for it has been fully proved that the heavier the plow the greater the force necessary to move it along the surface. This is a very important consideration. If a wagon is very heavy, after the inertia of its dead weight is once overcome it rolls forward easily, but the plow is a dead weight all the time.

1064. **Deep Plowing—its Benefits.**—"An increase of one inch in the average depth of plowing throughout the United States would produce a larger amount of profit, as compared with present results, than all the gold received from California." We believe this assertion; but we do not believe that all soils, without being previously subsoiled, are fit for this immediate increase in depth. Shallow plowing is the greatest error of American farmers. Millions of acres, though composed of mellow loam, a foot deep, were never stirred half that depth. Many a man owns a better farm beneath his furrow slices than the one he cultivates. "Deep plowing saves manuring." It is true that the soil derives no benefit from the plow, or other tool, only so far as it opens its particles so that the air can penetrate through the mass, and carry heat, moisture, and fertility to the roots of plants, which can penetrate a loose soil, but can not a compact one. A granite rock made pulverulent, and then stirred frequently in the air, and moistened, will become a productive soil. It has received the benefit of exposure to air, and that has fertilized it. All the plow, or any other tool can do, is to put the soil into the most favorable condition to receive this benefit. The best condition that any soil can be placed in, is that which will enable it to absorb the greatest possible amount of heat and moisture, with the least possible amount of surplus water, and loose free air, and that condition is not obtained by skimming over the surface. But remember that deep plowing is not admittable as a first operation upon all land. The soil must be deepened gradually. This is the case with the prairies. Our experience in regard to the time that prairie should be first plowed, and the depth, is when the grass is most succulent, and then turn just as thin a sod as possible. An experienced prairie farmer says: "From the time that the grass makes a vigorous growth, and while it continues to grow, prairie can be the most cheaply broken up with a good sixteen-inch prairie breaker, but should not be cut more than three inches deep. At other seasons, or when the grass is in a state of rest, use a double Michigan plow; set the top plow so that it will cut an inch deep, and the bottom plow two or two and a half inches deeper.

1065. **Steam Plows and their Use.**—We have faith that steam plows will yet be invented which can be economically used upon the Western prairies, though as yet that desideratum has not been reached in any of the locomotive machines tried for that purpose; and it is yet to be proved whether Fowler's traction engine, an English invention, will effect the object. It appears from reports of committees in England, and from some experiments made near Philadelphia in the autumn of 1861, as though it would answer the desired purpose. The steam plow that has attracted most notice in America is the one invented by Mr. Fawkes, of Pennsylvania, and tried without much success on the prairies of Illinois. It was driven by a twenty-horse-power steam-engine provided with an upright locomotive boiler, having 151 flues set upon a long frame-work, which rested on a large roller-shaped driving-wheel behind and two guide-wheels in front. A tank and box for wood or coal rested over the driving-wheel. The guide-wheels are in advance of the boiler, and are 18 inches wide and 36 inches high. The consumption of wood was one cord per day, and water one and a half barrels per hour; the weight about seven tons; cost, $2,500. The plows are on frame-work behind, capable of being lowered and raised by an assistant. The machine drew six plows, cutting twelve-inch furrows, between four and five inches deep. It plowed at the rate of one acre in forty minutes; on firm, hard ground it could go faster. On very wet ground the driving-wheel slipped. Mr. Fawkes has remodeled his machine, and several others have also been brought out, but up to the end of 1862, we do not hear of any steam plow in practical operation upon any of the great prairie farms.

Fowler's steam plowing is done by stationing an engine upon one side of the field, with an arrangement of wheels and pulleys, from which a rope is carried to the other side of the field, and through other wheels and pulleys and back to the starting-point. A frame on wheels carries two gangs of plows, one gang forward and one behind. This frame being hitched to the endless rope near the engine is drawn by its movement to the other side, when the hind gang of plows is elevated by a lever, and the other dropped, and the machine moved its width on the land to be plowed, and attached to the part of the rope that is moving toward the engine; and thus it traverses back and forth, the engine being moved along the headlands as the plowing proceeds. Of course this kind of plowing will not answer in small inclosures.

1066. **Substitutes for the Plow—Digging Machines.**—Much money has been spent upon digging machines, without any practical results. Mapes' rotary digger; Evans' rotary digger; Comstock's rotary digger, have all given promise of good results, and newspaper reporters have often told the public that the days of the plows were numbered; and henceforth the soil must be dug instead of being plowed; but the public are either slow to believe, or else there is some radical defect in the digging machines. Mr. O. Coe, of Port Washington, Wisconsin, invented a sort of digging harrow that is a good substitute for the drag-harrows, and altogether superior to the revolving harrows, and appears to be a tolerably good substitute for a small plow in preparing light land for small grain. It has its teeth upon revolving wheels that dig up the surface as it is drawn forward, leaving it light as well as pulverulent, the effect being entirely different from that of the harrow. The teeth of Mr. Coe's machine, he says, dig the soil six inches deep, and the machine does not pull any harder than an iron-tooth harrow, cutting the same width, and not nearly as deep. To dig the surface nine or ten inches deep, he thinks, will not require half as much power as to plow it the same depth. It works admirably upon Indian corn stubble, tearing the roots out of the ground, and fitting it at once for wheat-sowing. Of course it will not work among roots, or fast stones, and, we suppose, not well upon sod ground.

Prof. J. B. Turner, of Jacksonville Ill., has invented a machine which is rather a combination of other tools with the plow than a substitute for it It is a frame about six feet wide, fixed upon two broad wheels, which serve as rollers for the soil. This frame is arranged to carry two plows, when required for plowing, and at the same time drop corn or other seed. The plowshares can be removed and implements for cultivating corn put in their place, by which the ground is cleaned and the dirt turned to or from the hills. There are knives that precede the cultivators and shave off all the weeds. There is a guard attached to the frame that covers the seed corn so that it is never covered too much by the teeth. This machine costs $100, and requires two to four horses to work it.

1067. **A Home-made Clod Crusher** is thus described by an Illinois farmer: Take two pieces of light timber, eight inches square, ten feet long, and fasten them together, three feet apart. Upon the under side of these timbers, pieces four inches square, eighteen inches long are fastened, eight inches apart, and so arranged that the rear ones are not in line with the forward ones. These teeth are beveled and set so as to pitch downward slightly, and the frame is drawn diagonally over a plowed field, by which lumps are disturbed and pulverized.

1068. **A Simple Method of Broadcast Sowing** is thus described: The grain, or peas, or plaster to be sown is taken to the field in a light wagon, and a bagful emptied into a low box in the hind end, near which the sower kneels, and sows with both hands as fast as the driver goes ahead, the quantity being regulated by the speed. By this mode sixty bushels of peas were sown in one day, with less fatigue than six could have been sown on foot. The wagon tracks are sure guides for the sower, and enables him to sow evener as well as faster.

1069. **An Improved Garden Hoe,** invented by H. A. Lathrop, of Sharon, Mass., is made of three triangular pieces of sheet-steel, the middle one being riveted at the upper corner to the other two, and each attached to the three prongs of a forked socket on the handle, and is a very effective-looking implement for all purposes where digging instead of scraping is to be done. We look upon it as a decidedly good implement. Another effective hand-tool is made like a subsoil plowshare, the upper part of the standard having a socket for a hoe handle.

1070. **An Improvement in Corn Baskets.**—This improvement is particularly valuable where "basket stuff" is not found. The body of the basket is made entirely of upright splints or staves, without braiding in cross strands. These splints are nearly an eighth of an inch in thickness, and are held firmly in place between two pieces of thin board that form the bottom, and the two hoops that form the top binder or rim, by wrought nails that pass through each splint and clinch on the inside. The two pieces that form the bottom are placed with the grain of each piece running at right angles across the other, so that when the nails are driven and clinched, it prevents their warping or splitting, thus forming a very strong bottom on which the basket may be dragged about without danger of breaking or wearing out. The rim at the top being fastened with wrought nails that clinch, is very strong and does not become loose and let the handles slip out. A flexible wire hoop passes around the center of the basket, which is fastened to each splint separately, confining them firmly in their places at that point. They are made of a form to let into each other, like our peach baskets, and gauged to accurate measures, and being manufactured (of course, Yankee fashion) by machinery, are sold at about the same price of baskets made in the ordinary way, and are said to be more durable.

1071. **Hemp Harvester.**—Among the recent inventions is a machine for harvesting hemp, patented in May, 1858, by C. B. Brown, of Alton, Ill. We hope this latest attempt to substitute machine-work for the heavy hand labor required to cut the hemp of a large growth will be successful. It is something much needed.

1072. **A Willow-Peeling Machine.**—A willow peeler, patented by J. M. Wood, is extremely simple, and is composed of a graduated screw which lies across a disk, so that the small ends of the willow being inserted in the small end of the screw, are rolled over and carried through to the but of the willow, which then has arrived at some of the large threads according to the length of the stick, and in its passage is entirely stripped of its bark. The whole machine can be carried on a man's back.

1073. **A Tire-Bending Machine,** invented by Mr. Mosher, of Chenango

County, is a very simple, cheap, and effective machine, which every country blacksmith should have. It consists of a plank wheel, sized for large and small tire, with an inner roller attached to a lever that operates upon the straight bar, and gradually bends it into shape. The whole machine could be made for $5, and although not strictly classed under the head of agricultural machines, is one in which all farmers are interested, as they are in whatever cheapens the labor of the smithery.

1074. **The Ox-Shovel, or Road-Scraper.**—The ox-shovel is a very valuable farm implement. One called Arnett's patent scraper, or ox-shovel, consists in an arrangement for opening the hind part and letting out the load without upsetting it. This saves a deal of very hard labor. There is another scraper that for some purposes is an improvement upon the above, as it is suspended under a pair of light wheels, with a horse in the shafts, and is loaded in the usual way, and then the handles are borne upon and the shovel held in a level position by stay chains, until the horse is driven to where the dirt is needed, when the catch of the chain is easily unloosed, and the shovel emptied behind by bearing upon the handles, or by jumping on and pressing it down by weight. It was the invention, so it is said, of a man with one arm, who could then out-work a man with two hands, who used the old style ox-shovel.

1075. **The Horse-Hoe Road-Scraper.**—This tool is so little known, and is yet so important, that we give it prominence in a separate paragraph. We have seen it much used in the vicinity of Chicago, and only in one or two other places. We feel satisfied that it would be adopted by all who see it work, wherever loose earth is to be scraped from the sides of a road into the center, in the operation of turnpiking. This machine is simply a horse-hoe, as the other is a horse-shovel. It is made for one or two horses, or oxen, with thills, or a tongue, the hind end of which is attached to standards just high enough to keep the tongue on a level when at work. To the lower end of the standards is attached the hoe, which is made of wood with an iron or steel edge, or the whole hoe is made of iron. If those who have seen a wire-toothed horse-rake will fancy a continuous iron plate in place of the teeth, they will have an idea of this horse-hoe scraper.

1076. **Machinery Saves Manual Labor.**—The following, though not a farm implement, is one that all farmers are interested in, because whatever cheapens labor connected with agriculture is to the farmer's advantage. The great lumber mills are often necessarily located in places so inaccessible to teams, that getting lumber from them is very laborious and expensive. At Williamsburgh, Penn., the mill is 1,200 feet from the canal, on the opposite side of the river, which is lower than the canal. Formerly the boards were run down to a boat and loaded by hand, and then ferried over and carried up the bank. Now, the whole work is done by the mill-power, which sends over 10,000 feet of lumber per hour, upon a lumber-shute suspended upon wire cables. The contrivance is so ingenious, and cost so little ($2,000), considering its value to the mill-owners, that we advise all who may have mills in such inconvenient situations, to adopt this valuable improvement. The bottom of the shute is furnished with a series of rollers, upon which a pile of boards is placed at the mill, and then a single board being sent through a pair of pressure rollers, pushes the pile its length ahead, when that board being loaded is also pushed forward and drives the load before it, in a continuous stream of lumber.

1077. **The Grindstone.**—There is no machine used upon a farm that is more important than the grindstone, and no farmer who knows the value of sharp tools, and the loss of time by using dull ones, will try to conduct farming without one grindstone, and he will often find it good economy to have two or three. There is no surer mark of a shiftless farmer than that of a miserably mounted, rickety, old grindstone. No farmer can afford to do without a grindstone mounted upon friction rollers, so that it can be operated by a treadle, with the foot of the person who holds on the tool, as well as with a crank. It will save its cost every year. But above all other things connected with the grindstone, be sure never to be seen going to a neighbor's house to grind your scythe or ax. You can not afford to borrow a grindstone.

1078. **A Variety of Agricultural Tools Noticed.**—We can not give even the names of all other agricultural implements; much less a description of them, and only intend under this head to call the attention of farmers to some of the most indispensable of those of recent invention. Of course, the plow leads all other farm implements, and a good farmer will have one suited to all kinds of work, and will not attempt to do all his work with a single size, nor with plows all of the same shape. The same rule should hold with harrows and cultivators. If oxen and horses are both worked on the farm, it should have a heavy ox-harrow, and one made strong and light, for a pair of horses to walk quickly over the field, for in the rapidity of the movement lies the perfection and economy of the use of a harrow on smooth land. A one-horse harrow will be found a very useful tool, even on a farm where large teams are kept; and no farmer can afford to do without one, at least, good steel-toothed cultivator, such as those made at Ilion, N. Y.; or the Knox horse-hoe; or some similar labor-saving implement. The best universal harrow, in our opinion, is the one invented and given to the world by Hon. Geo. Geddes, of Onondaga County, N. Y. It is a double triangle, one following the other, hinged in the center, so that if drawn along a dead furrow the center would rest on the bottom, while the wings would rake the sides to the top. Chandler's harrow is a single triangle, folding in the center. The Scotch harrow is two square frames hinged together and drawn at an angle. There is a similar one made for one horse. "The expanding harrow" is a square frame, so arranged that its width is increased or decreased by shifting the link of a draft chain. This is a convenient, inexpensive form. The twenty teeth are set in four bars, and each one at the end passes with a round neck through a bar, serving as a hinge or pivot, so that taking hold of two corners the bars draw together, making an elongated diamond-shaped harrow, that would run between two rows of corn. Then draw upon the other corners and it comes back into a square form, and can be held there, or at any angle, by the chain that is hooked on from corner to corner.

Of cultivators there are sizes and forms suited to all purposes, generally with three to five teeth, and these of various forms, in wooden or iron frames, made to expand so as to work wide or narrow rows, and as each tooth is a little plow, a horse makes five small furrows as fast as one with a plow. Some of these implements are especially designed for hoeing corn, and answer most admirably for that purpose. One is designed for hoeing cotton, and also answers well for carrots and similar crops. The operation may be likened to that of a pointed shovel slipping along just under the roots of the weeds, with teeth on the upper end of the shovel, which combs out the weeds, leaving them on the dirt instead of under it. The implement called a "cotton sweep" is made to shave the surface with sharp knives, and rake out the weeds thus cut off, with small harrow teeth set in an expanding frame, to suit all widths of rows. This is an excellent implement for all hoed crops on smooth land. There are several forms of hand cultivators and machine hoes which some gardeners think well of, but all are not economically practical.

Small seed sowers and planting machines are numerous, and are truly very useful and economical for planting all small seeds, as ruta baga, carrot, etc., and, in a small way, for corn. In large fields, corn should always be planted by a horse machine. And so should all small grain and grass, as there are simple, inexpensive machines arranged to plant wheat in straight rows, eight or nine inches apart, and each grain at an exact distance from its fellow, and all at a uniform depth; and there are other machines for broadcast sowing; and machines for harvesting grain and hay, which we have spoken highly of in the chapters devoted to grain and grass. A very valuable machine for lifting rocks is noticed in No. 982. It is compact, wonderfully strong, has nothing liable to get out of repair or break but a chain, and costs $275. The substitution of machines for hand-labor within the last fifty years has been wonderful, and now almost every species of farm-work may be done by machinery, whether it be plowing, sowing, reaping, gathering, thrashing, winnowing, or grinding. Even the old well-sweep has given place to the water-ram. It is manifest from the great demand that has sprung up of late years for these new and useful inventions, that the light of intelligence is beginning to diffuse itself throughout the country, and that while improved methods of culture are being introduced, private and public interests are becoming more closely united.

CHAPTER XIV.

STAPLE SOUTHERN CROPS.

COTTON, CANE, RICE, TOBACCO, HEMP.

SECTION LVI.—THE HISTORY, GROWTH, AND MANUFACTURE OF COTTON.

"COTTON is king," is the stereotyped phrase of those who have so long devoted all their energies to its production, traffic, or manufacture, that they know no other god. With those who know the value of the true grasses, it is not king of all the farm crops, though it has long held a mighty influence over the destinies of America; and the events that have occurred during the compilation of this volume, in the years 1861 and 1862, are so intimately connected with cotton, that the author believes a somewhat extended history of it, and the introduction of its culture into this country, will be interesting to many readers. Of course, many who read do not and can not grow cotton, because their home is in too rigorous a climate; but will that make its history any less interesting? To some who have never grown it, yet owing to their location in temperate portions of the Middle States, may desire to do so, this section will possess interest, for it contains much useful information. Although we have never admitted the regal claim of cotton, we have always admitted the beauty of cotton-fields; not only because they are beautiful, but because with the production of this "vegetable wool" there is connected a vast utility and improvement of the human race. Though in its production barbarity and cotton have grown upon the same soil, and misery has been interwoven with warp and woof in its manufacture, its use has greatly increased civilization in the great human family, because it has done more than anything else to clothe the naked, and that is the first great step in improvement of savage life. It not only furnishes the cheapest substantial covering for the half clothed, but it furnishes the material for more than half of the ornamental dress of mankind, and therefore may be called, not king, but one of a good King's best gifts to his subjects; because clothing next to food is their greatest want. It is unfortunate that a substance for which there is no substitute can only be grown in southern latitudes, for it is true that silk, flax, wool, hair, hemp, and skins are all insufficient. Their production is too limited, and if

COTTON PLANTATION IN SOUTH CAROLINA

Copied from a Painting made on the spot

PLATE XX.

(Page 928.)

This is a very interesting picture. Interesting, because cotton has so enwrapped itself around politics, and entwined its fibers into the history of the age, that every one is interested in its history. This we have given, though briefly, very succinctly in this chapter, and this plate gives a most perfect representation of its growth and appearance at harvest time. At the upper left-hand corner will be seen a branch, leaf, and flower unopened. Beneath it is the flower expanded in its fullest beauty, as it is in the morning. Under that it is seen as it appears in the evening. It will open again, but with a changed color. It is creamy white the first day—it is red the second; the third it is rotting upon the ground. To the right the bolls are seen, nearly ripe, quite ripe, and over-ripe, in which condition the cotton will blow away, or fall to the ground by the weight of its seeds and wet, leaving the dry, brown husk of the boll, as represented upon the upper right-hand corner. We have spoken of the beauty of the cotton-field when in bloom, ¶ 1081, and when the bolls are open, as represented in the center of this picture. We have also fully described the culture and cost of production of this great staple crop.

The scene represented in the lower compartment of this plate is such a one as we have very often seen magnified in its grandest proportions. The black dots around the woman in the foreground must not be mistaken for a part of her dress, as it appears more like silk than it does like a coarse sack, as it is, into which the locks of cotton are thrust as fast as gathered. This is emptied into the great baskets, which are carried out of the field upon the negroes' heads. We have seen a hundred baskets carried thus in one gang of pickers, return at dark from the task begun at dawn. Beautiful as this picture is, it gives but a faint view of the reality.

all together were used as much as cotton their cost would be beyond the reach of many, while cotton can be produced without limit as to quantity, and at so small a cost that all classes can afford the use of the cheap fabrics.

1079. **The History of Cotton.**—The genus *Gossypium* is divided into *Gossypium Herbaceum*, *G. Hirsutum*, *G. Barbadense*, and *G. Arboreum*. There are many hybrids of each. The plant is indigenous to the tropical regions of Asia, Africa, and America, and is easily grown in all semi-tropical regions, and occasionally still farther north. The southern limit of Europe (36° 33′) is too far north for its natural growth, though it has become acclimated in much higher latitudes; in some of our Western States up to lat. 40°. The first cotton manufactured in Europe, it is said, was obtained from the Arabs. Being indigenous to India, cotton was early manufactured there, but we judge it was not known in Solomon's time, for neither he nor Homer mentions it, nor is it ever spoken of in the Bible, though linen is often mentioned. How long cotton cloth has been used in India is unknown, as it was abundant when the country was first visited by Europeans, though rudely manufactured, and not much improved now; it is spun and woven much in the same way it was three thousand years ago. The first mention made of cotton in history is by Herodotus, who lived four hundred and forty years before Christ. He says: "There is a plant in India which produces wool, finer and better than that of sheep, of which the Indians make their clothes." He describes a cuirass sent from Egypt to the king of Sparta, embellished with gold and with "fleeces from trees." A century later, Alexander's Grecian army invaded India, and first saw cotton. Nearchus, the admiral, who led the expedition down the Indus, gives an account of the clothing of the people, "finer and whiter than flax, which was made from a substance growing in pods on a tree, called by the natives Tula;" and his officers have left a description of the cotton dress and turban which formed the costume of the natives at that remote period. Theophrastus, the disciple of Aristotle, notices the growth of cotton both in India and Arabia, and observes that the cotton plants of India have a leaf like the black mulberry, and are set on the plains in rows, resembling vines in the distance. On the Persian Gulf he noticed that they bore no fruit, but a capsule about the size of a quince, which, when ripe, expanded so as to set free the wool, which was woven into cloth of various kinds, both very cheap and of great value.

Strabo, in the first century, spoke of flowered or printed cotton cloths, and beautiful colors of Indian dye; and that cotton was then grown at the head of the Persian Gulf. Pliny, later in the same century, says: "There grows a shrub called *Gossypium* or *Xylon*, in Upper Egypt, producing a stuff from which the white garments worn by the priests are made." This was cotton, which had been but lately introduced from India, through Arabia and Persia, and no doubt had to work its way slowly against the interest and prejudice of those who had long grown flax and made fine linen. But they had to give way to the mighty power of cheap production. That cotton was not in the pyramid age of Egypt, has been proved by microscopic examination of the fibers of mummy cloths. But Arian, in the second century, speaks of trade between Arabs and Greeks with India, in cotton cloths; though undoubtedly to a very limited extent, owing to the difficulty of supplanting linen with a less valuable fabric before machinery was brought to its aid, by cheapening the production. The list of merchandise in the Roman tariff of those days does not mention cotton cloths, though it does silk, which was also brought from India, though mostly from China. It does indeed seem surprising that cotton manufacturing should have been known for thirteen hundred years, upon one side of the Mediterranean, before it crossed over to Greece and Italy. It seems equally strange that Rome did not import the exquisitely fine cotton fabrics of India, while she sought silks from a still more remote region in China. Cotton has often been found, by European travelers, growing wild in Africa; and it was found by Columbus in Hispaniola, and among the presents sent by Cortes to Charles V. were cotton mantles, vests, and carpets, of various figures, and in the conquest of Mexico the Indian allies wore armor of quilted cotton, impervious to arrows.

Cotton garments have always been held in high favor by faithful Mohammedans because their Prophet consecrated the fabric, in their eyes, by wearing pure white cotton garments as a sort of holy dress, upon public occasions. On the other hand, there was a strong prejudice and opposition to the introduction of cotton into China, owing to the fact, probably, that the holy men of that country all wore silk and wool. Marco Polo, a traveler of the thirteenth century, found the manufacture of cotton cloth extensively carried on in Persia and the provinces bordering the Indus. He only saw it growing in one town in China, while in India it was the universal cloth. It is singular that it should have flourished in the latter country one or two thousand years before it was adopted by its nearest neighbor, China; and it might have remained uncultivated there still longer, only that after the Tartar conquest it was introduced by force. The worshipers of cotton in this country may wonder how people could be so prejudiced. History tells us that cotton was grown in Brazil in 1519. The Aztecs, however, were probably the largest cultivators and most successful manufacturers of any of the races inhabiting this continent at the time of its discovery by Europeans, and it is also probable that the "cotton-tree," now found in Central and South America, is indigenous to that region.

1080. **History of Cotton Culture in the United States.**—It is supposed that cotton was introduced into the territory of the United States from Barbadoes, about 1664, as we have no proof that the Indians knew anything of its value. About 1778–9 a gentleman named Burden, living upon John's Island, a few miles south of Charleston, S. C., clothed his negroes with cotton cloth made upon the plantation. At that time the only manner of separating the lint from the seed was by the fingers; for then there were no cotton-gins, not even the rude affair still in use to clean Sea Island cotton (*Gossypium herbaceum*), which was the only kind cultivated—probably because the lint does not adhere to the seed as it does to the green seed, or upland variety. About 1849 or '50 we spent some days upon the Burden plantation, and learned much of the early history of cotton from a son of the Mr. Burden first spoken of, who said that when it was first grown, the constant evening work for all the family—men, women, children, and servants—was picking cotton; and that simple and inefficient as the roller-gin is compared with the saw-gin of the present day, it was hailed with joyous acclamations when it was found that it would do the work previously accomplished by the very toilsome labor of the hands. Mr. Burden thought the first cotton ever shipped from this country was a bag sent from Charleston about the year 1740. Upward of fifty years elapsed between that and the next shipment. During the Revolutionary war, cotton was generally grown for family use in eighth and quarter-acre patches. In 1793, cotton was planted for a crop by a Mr. King, and in 1795 a million of pounds were exported from Charleston. In 1804, Mr. Burden raised the first crop of fine, long staple cotton in the State. This was produced from carefully selected seed, from stalks growing among that planted for family use, which seemed to possess the quality of a long, fine, silky fiber in an eminent degree. He continued his experiments of improving the seed more than twenty years. In 1826 he put up sixty bags of a superfine quality, which sold for $1 10 a pound. In 1828 he sold the same quality at $1 25; ordinary Sea Island sold the same years from 24 to 40 cents. His first crops were grown on a small island called Burden's Island. The first crop on John's Island was grown by Mr. Legare, in '96. A good average yield of Sea Island cotton is 200 pounds to the acre. Where one planter makes that, one hundred do not, probably, make half that. Mr. Burden made an average of 300 pounds to the acre, and 400 have been produced. He recollects the current price of cotton, about 1794, was 25 cents a pound, and that there was only one buyer in the city of Charleston.

About the year 1785, the seed of upland, or short staple cotton (*Gossypium hirsutum*), was introduced into Georgia from the West India Islands. The difference between the two varieties may be easily known, if readers will recollect that the seed of upland cotton is of a greenish color and hairy—that is, the lint adheres to the seed, while the lint of the long staple separates freely, leaving a smooth, black cotton seed, much resembling that of the common sunflower. The cultivation of upland cotton for export now extends from the Ohio River to our utmost Southern limits, though not a certain crop north of latitude 36°. The neighborhood of Nashville, Tenn., and Raleigh, N. C., may be considered the northern limit of its successful cultivation, or rather as far north as it can be grown to compete with the more favorable localities south of that line, though we have no doubt that improvements in the mode of culture and use of proper fertilizers will enable farmers to grow it with considerable success much farther north. It is certain that the cultivation of land without manure, and with very shallow plowing, with such an exhausting crop as cotton, as generally practiced upon

Southern cotton plantations, evinces about as much of the spirit of the darker ages, as did the Chinese when they stubbornly refused to grow cotton because their fathers had always been successful in growing sheep and feeding silkworms; or as the policy of the "Confederate Government" of the rebel States, in ordering all cotton burned, rather than allow it to reach any civilized country, to be manufactured for the general benefit of humanity.

1081. **Beauty of the Cotton-Fields.**—As a flowering plant, cotton might be cultivated for its beauty alone. The leaves are a deep, glossy green, grow profusely upon branches forming a handsome cone, which is covered with a continued succession of white, straw color, or pink flowers, according to their age; and then with its curious-shaped fruit, first small and green; then forming squares, and changing brown; then cracking open, and showing glimpses of its snowy white interior; then fully expanding into a handful of fleecy white wool; then gradually falling and hanging in pendants or dropping a snowy fleece upon the earth; and so, from the opening of the first blooms, the scene is ever-changing, ever-beautiful, beyond the power of artist's pencil to portray. And the beauty of the scene is not, as with grain, marred by the harvesters; for in a cotton-field we see the pickers, like black ducks upon the white-capped waves of some wind-tossed sea. Even in mid-winter, when all else is black and drear, an unpicked cotton-field looks like a plantation of white roses or snow-ball flowers. The black shade of the picture is not the color of those who labor in the cotton-field, but it is "man's inhumanity to man."

1082. **The History of Cotton Manufactures.**—By the Mohammedan power the use of cotton was introduced into Spain, and with that power it declined. From the fourteenth to the sixteenth century, cotton was manufactured to some extent in Germany, Italy, and the Netherlands, and it was carried, earlier than it otherwise would have been, to England, by the religious persecutions of manufacturers on the Continent. That was the starting-point of the "cotton-power of England," which has promoted, fostered, and upheld the "slave-power" of America.

The earliest record of cotton manufacturing in England is in the "Treasure of Traffic," published in 1641. The author, Lewis Roberts, says: "The people of Manchester buy yarn of the Irish to weave, and they also buy cotton-wool in London, which comes from Cyprus and Smyrna, which they work into fustians, dimities, and other such stuffs for sale; it is sometimes sent into foreign parts." Sometimes sent into foreign parts for sale! And that was only 200 years ago. The cotton manufactures of the present day are also *sometimes* sent abroad from England, and perhaps cotton-wool from Cyprus and Smyrna is sold in London; but we doubt whether in quantity sufficient to supply one single cotton factory. Two hundred years ago that same town of Manchester spun the said *cotton-wool* by hand upon a single spindle wheel, not much superior to its prototype, in India, where it has been used, without improvement, for three thousand years. At first, in Manchester, the cotton yarn was generally used for filling upon linen warp, and was woven upon a hand-loom also like that used in India for the same purpose. As this kind of fabric became better known, the demand increased, and then a new custom or system of manufacture was introduced. About the year 1760, the practice of Manchester merchants was to send agents into the country roundabout, with linen yarn and cotton-wool, who engaged the work of carding, spinning, and weaving to be done in families. Sometimes a weaver by trade took the job and sub-let the spinning. Sixty years later, it was a common practice for New England merchants to send cotton yarn around among their customers to be woven. The author has carried many a wagon-load of yarn to farmers' families, and afterward gathered the webs into the store, to be measured, folded, and packed by hand for the wholesale market. Of course these were coarse goods—and so were those first made at Manchester—but the demand for them was great, and induced invention for their improvement. In 1768 the spinning-jenny was invented by James Hargreaves, an ingenious English carpenter, and rude as it was, it was found that upon this machine one person could spin as much as eight upon the common wheel. But still it only produced the same quality of yarn, which was not suitable for warp. The necessity of more warp than the flax-spinners of Ireland could furnish, and the desire to produce fabrics entirely of cotton, again stirred the inventive genius of the age, and Arkwright's machine was given to work a world-wide revolution, not only in the manufacture of cotton, but in the habiliments of mankind, and in almost all the economies of life. Then came Crompton's mule-jenny, Cartwright's power-loom, and Watts' steam-engine, and cotton and its fabrics were sought after by all the nations of the earth. The demand in England for the raw material exceeded all human calculations. In 1780, and for four years previous, 6,766,613 lbs. per annum were imported. In 1790 the imports had increased to 31,447,605 lbs. In 1800 they had increased to upward of 56,000,000 lbs., and in 1850 to upward of 758,000,000. Of the immense trade in cotton between this country and England, from 1850 to 1860, we need not speak—it is of the current history of the age, and has been the cause of much of its sorrow. In 1790, Alexander Hamilton called the attention of the American people to the importance of the cotton crop, not as an article of export, but on account of the vast extent which the home manufacture of cotton fabrics had assumed in the households of the people. He alludes to the then remarkable fact that muslins, bed-ticks, checks, stripes, hose, fustians, coverlids, and various mixtures of cotton and wool, or flax, are made to a greater extent than required for family use by the manufacturers, and even hints at exportation. Both he and Mr. Madison spoke of the probability of extending the cultivation of cotton from the garden to the field, and of sending the products abroad for sale. With all their sagacity and far-seeing power, they had no conception the product would reach 4,600,000 bales within seventy years. A bale of 400 lbs. per acre (1,200 lbs. in the seed) is a good crop. The largest yield known was 6,300 lbs. of seed cotton, grown by Dr. Cloud, of Alabama, upon one acre.

Of the manufacture of cotton in other countries, we have already said that it was most ancient in India. Cortes, when he invaded Mexico, found the manufacture of cotton cloth in a considerable state of perfection. Humboldt mentions the use of cotton in the manufacture of paper. Some of the cloths made by the Mexicans were curiously figured by interweaving colors of scarlet and blue, made from their native productions of indigo and cochineal. Columbus carried home specimens of cotton to prove that he had found the Indies. Time proved them to be the West instead of the East Indies; and time will probably prove that there are other fibrous plants which can be grown where cotton can not, which will serve as a substitute for it in clothing mankind.

1083. **The History of the Cotton-Gin.**—The world is indebted to the inventive genius of New England for the vast quantity of cotton it has used within the present century. Without Whitney's gin it could never have been prepared for market and manufacturing. It is due to his memory in connection with a great industrial interest, that we should give a brief history of the inventor and invention, for without it a portion of mankind would be but scantily clad. The inventor of the saw-gin, Eli Whitney, was born in Westborough, Massachusetts, Dec. 8, 1765. In the winter of 1791–2 he was a private tutor or guest in the family of Mrs. Greene (widow of General Greene, of Revolutionary memory, afterward Mrs. Miller), who first called his attention to the difficulty of separating the lint from the cotton seed, and afterward aided him by suggesting the use of a brush to clean the saw-teeth of the first model that he built. Crude as that model was, and unlike the highly-finished machines of the present day, the principle remains unchanged. That principle is for a revolving cylinder, armed with teeth, like a circular saw (hence the name of saw-gin), to seize the lint and pull it through narrow slits between bars of iron, leaving the seed behind, and that lint is cleared from the teeth by revolving brushes, and generally blown away into a lint-room. An invention by Emory Brothers, of Albany, N. Y., is a great improvement upon the blowing process, for it compacts the lint into bats ready for baling, and saves labor, room, and improves the cotton.

It was in June, 1792, that Whitney presented his petition for a patent to Thomas Jefferson, and exhibited to him the model of his machine, which has in the seventy years since then worked such wonders in the agriculture of the Southern States. That model was destroyed when the United States Patent Office was burned, but a copy of it was exhibited in the New York Crystal Palace, where we examined and compared it with gins now in use. Whitney's first gins were worked by hand, and one with a cylinder of $2\frac{1}{2}$ feet long was capable of cleaning fifty pounds of cotton a day. This was fifty times as fast as it could be cleaned by hand. With the best gins of the present time, driven by the power of four or six mules, running a cylinder twelve inches diameter and five feet long, 250 revolutions a minute, 150 lbs. of cotton can be cleaned in an hour, and a regular day's work is about three bales.

The introduction of the cotton-gin raised the market value of the cotton lands of the South from 50 to 1000 per cent., and generally people grew wild with excitement, and unprincipled men thought to rob the poor inventor of his just rights, and excite popular prejudice against this "Yankee invention," or, rather, against his legal right to claim a fair compensation from those who were enjoying such great benefits from his ingenuity. As usual, they talked about the "oppression to the South" of such a patent monopoly, and sought to "compromise" the matter by asking Congress to pay Whitney for his patent and throw it open to the benefit of all the cotton-growing States. For once Congress refused what it never has been known, I believe, since to refuse, that is, to grant all that Cotton had the modesty to ask. For ten or twelve years poor Whitney contended against the cotton interest, which seemed determined to use his invention without paying for his patent. The greatest wrong was done him in Georgia. The courts would not give him a verdict upon the clearest testimony. One judge decided against him upon the ground that cotton could not be profitably grown without the gin, and that a patent right upon it was too great a monopoly for any one man to possess. South Carolina first agreed to pay $50,000 for the patent, and after Whitney had received $20,000 of the amount, the Legislature repealed the law and sued him for the money. The law, however, was restored after several years. North Carolina and Tennessee also bought the right at so much per saw for all made in the State. Georgia fought to the last, but Whitney finally obtained several verdicts in his favor; yet not till the patent had nearly expired. Since the time of Whitney, improvements in the cotton-gin have been a constant source of revenue to the Patent Office, and its manufacture furnished employment to thousands of mechanics until the slave power rebelled against the United States Government and stopped the cotton cultivation, and the manufacture of cotton-gins ceased as a natural consequence.

1084. **Sea Island Cotton.**—This variety of cotton received its name because it was first grown upon the islands near Charleston, S. C. We have already stated how it differs from the upland variety. It is more valuable, because the fiber is long and silky, and suitable for spinning the finest thread. Its value is also enhanced by the way it is ginned. This process we will describe as we have seen it performed upon many plantations.

1085. **How Sea Island Cotton is Ginned.**—The gin is an exceedingly simple machine. It is merely two wooden rollers, about eight or ten inches in length, and less than one inch in diameter, made of some soft wood, usually common long-leaf pine. One of these rollers is inserted in the socket of an iron balance-wheel of about fifteen pounds' weight, which is mounted upon a bench and operated by a treadle. These rollers are held together by a light spring, and put in motion by the operator's foot, while he holds the cotton with his fingers to the roller. These seize the lint and carry it through while the seeds fall back into a box below. Great care has to be taken that a seed is never allowed to pass through the rollers, as the mashing of seeds stains and injures the cotton. The rollers have to be renewed every day, and sometimes oftener, if the wood is not exactly suitable, which can only be ascertained by trial. If too hard, the wood polishes and will not take hold of the lint; and if too soft, it becomes rough directly, and winds the lint around so as to stop operations. Experience has shown that the rollers made of green pine, and not very smoothly made, are the best; but even these should be renewed daily. Experience has proved, too, that the gin must be driven by the ginner's own power, so that he can feel when a seed is caught between the rollers. A Sea Island cotton-gin may be compared, in its size and operations by the foot, to a sewing-machine. The bench is about 3½ feet high, 1½ feet wide, and 3 feet long, the balance-wheel having an opening at the left hand, so that the center is just above the table. It has a bearing on one side, and a short crank and a socket on the other, into which the lower roller is driven, and forms a bearing for that side. As the seeds are hard, they communicate, if caught in the roller, a little jar to the foot. The usual task of a stout man is to gin 25 lbs a day. When the weather is very favorable, that is, in a clear, dry atmosphere, 40 lbs. are sometimes ginned by an experienced workman. As the cotton falls from the gin it is gathered up and taken to a well-lighted table, where every mote, speck, and stain is carefully removed. If a mashed seed is found, the ginner is required to leave his machine and come to the "moter's" table and pick it out. This is done to teach him to be careful, and if the offense is often repeated, he will be likely to receive something more than words as a reminder of his carelessness. The ginning is always done by the most experienced men, and the "moting" by the most careful women on the plantation. The work of the "moters" is all overlooked by an inspector, who is held responsible for the perfect cleanliness of the cotton. After the cotton is ginned, it is injured by exposure to the atmosphere. The ginning can be done to advantage only in perfectly dry weather, and the packing in damp weather; it is therefore taken from the "moter's" table and closely packed in a dark room until ready for bagging. This process is very tedious. The empty sack is suspended through a hole in the floor; a portion of the cotton is then thrown in, and the packer gets in with a wooden rammer and continues to drive down successive layers until the bag is filled. The Sea Island bale is made from four yards of cloth, and holds 300 lbs.; and a packer's task is to finish one bale a day. If pressed by machinery in square bales, like the upland cotton, the quality is said to be injured, and it will not sell for as much money in market as it does in the regular round bales.

1086. **How Sea Island Cotton is Grown.**—Upon a majority of the plantations visited by the author in 1850, nearly the entire work was done by hoes; the use of plows was almost unknown. The average yield of cotton is less than 150 lbs. per acre, and it requires four pounds of seed cotton to make one pound of lint. The plants are set in drills five feet apart, the stalks from eight to twenty-four inches apart, and one good field-hand can plant and tend about three and a half acres. The manner of planting is to scrape all the manure and trash into the hollows between the old rows, then dig with hoes and haul one half of the old beds from each side upon the row of trash to form a bed for the next crop. The seed is put in the last of March or first part of April. When ready to gather, it is picked with great care, and at the same time assorted in the field; then assorted again on the drying scaffold; afterward stowed away in the packing-house, and then taken to the trasher, which is something like a fanning-mill; then it is picked over by hand and spread in the sun; lastly taken to the ginner.

1087. **How Upland Cotton is Grown.**—This is the *Gossypium hirsutum*, the lint adhering to green seed, and it is killed by frost as easily as tomatoes. In its growth it somewhat resembles buckwheat, though as far south as Mississippi it becomes a woody shrub, tall and firm enough for walking-canes. In Tennessee, Kentucky, Indiana, and Illinois, where cotton is sparsely grown, the shrub seldom exceeds three feet in height, and is not so woody as to make the work of plowing under the dry stalks very difficult; though it is quite so farther south, where they are either cut off and burned, or beaten down with clubs and plowed under as well as practicable, with the small plows in common use. As the cotton plant has a tap-root, the soil should be deep; and instead of deepening it by plowing, the common practice is to throw up the land in beds. It would be better to underdrain, subsoil, and make all the soil mellow, and then plant nearly on a level; raising the beds only just enough to protect the young plants from injury by heavy rains. Owing to the extreme delicacy of cotton plants during the first stages of germination and growth, it is imperatively necessary to pulverize the beds thoroughly, by plowing and harrowing or hand hoeing. In the extreme northern limits of the cotton-growing region it will be found profitable to plow in autumn, and let the frost aid in the process of pulverization. The beds are made about as far apart as corn rows—farther at the South; say, five to nine feet. A slight furrow is opened in the top, and the seed drilled pretty thickly by hand, so as to allow for a great many to fail; and if too many grow, as they generally do, they are "thinned to a stand;" which upon the rich canebrake lands of Alabama would be two feet between stalks in rows four and a half feet apart. Upon such land we have seen twenty bushels of seed to the acre used, to provide against the destruction of the plants by the crawfish. If most of the seed should grow, a peck per acre would be sufficient. In the vicinity of Montgomery, Ala., which we take as the average isothermal line in the cotton region, the seed requires nine days' exposure in the soil to vegetate and get above the surface; and the most approved planting season is the first of April, and the average yield is about 150 lbs. of ginned cotton per acre.

In extending cotton cultivation northward, seed should be obtained as near the locality as possible, and soaked before planting. Afterward, select in your own field from early, five-lobed balls, and thus, like sweet potatoes, it may be gradually acclimated. At the South, very little care is exercised in selecting seed. In planting, it is covered by hoes, or by harrows, or a wooden drag, drawn by a horse, and not over an inch and a half deep. The greatest trouble is during the first growth, when, if the ground is not kept clean, the crop will get a back-set that will put it in danger of autumn frosts. The best implements are such as successful carrot-growers use, which scrape the surface close to the plants. "Thinning to a stand" is the work of the hoe, striking across the beds, and cutting out the surplus plants. The thinning should not be done all at once—not at the first or even second hoeing; for allowance must be made for cut-worms and other depredators. The last work done is with a turning-plow, to throw up the earth to the beds, so as to leave deep water furrows between. The first dressing or cultivating commences soon after the plant puts out the second or third leaf, and the hoeing or cultivating should be repeated as often as the weeds, or the condition of the soil render it necessary, until the plant is in bloom and begins to show balls. Manure for cotton is just as valuable as for any other crop, and guano, superphosphate of lime, carbonate of lime, sulphate of lime, have all been proved good; and salt is undoubtedly beneficial—for Sea Island cotton indispensable. It is best to add the salt to a compost, where muck forms the principal ingredient.

There are three pickings of the crop: first, when the earliest balls open; second, the principal picking; last, the gleaning after frost kills the stalks. The sooner the cotton is gathered after it opens the better, as the sun dries up the oil that pervades the fiber. It requires practice to be an expert cotton-picker, and great care to be a good one; because the value is much injured by allowing any trash to get mixed with the lint. In picking, the lock is seized so as to bring it all away at once, and is thrust into a bag, the mouth of which must be kept nearly closed, to prevent leaves from getting in, and when full is emptied into large baskets which are generally carried on negroes' heads to the drying scaffold, where the cotton is sunned one day before it is stored. The picking season is a laborious one. The slaves are all tasked, and have to work every minute of daylight, and often long after dark in getting the cotton home, and no one is exempt who is capable of doing the work.

1088. **The Cost of Growing Upland Cotton.**—To show the cost of production we give the following detailed account, taken by the author in 1849, from the books of one of the best conducted plantations in the State of South Carolina, that of Col. Williams, of Society Hill, whose plantation is on the Great Pedee River. He then worked 140 field hands, and planted 15 acres of corn and cotton per hand. The cotton averaged, the previous year, upon 1,130 acres, 1,000 pounds in the seed per acre; and the corn, on 980 acres, 25 bushels per acre. The cotton crop averaged six bales per hand.

Cotton is planted in beds 4½ feet apart, and left to stand 12 to 18 inches apart in the rows. Corn is planted 4½ by 5 feet, two stalks in a hill.

The following was the cost of making 331,136 pounds of cotton, packed in 796 bales, averaging 416 pounds each:

3,980 yards of Dundee bagging (5 yards to a bale) at 16c.	$636 80
3,184 lbs. of rope at 6c. (4 lbs. to a bale)	191 04
Taxes on 254 plantation negroes at 76 c.	193 04
Taxes on 4,200 acres of land, valued at $15 an acre	70 00
Wages of three overseers	900 00
Doctor's bill and medicine, on contract, at $1 25 a head	317 50
Iron for blacksmith's shop	100 00
Cloth from his own factory	810 00
200 pairs of shoes from his own factory, at $87\frac{1}{2}$ c.	175 00
100 oil-cloth capotes	125 00
20 woolen blankets, given one at each birth	25 00
Calico dress and handkerchief, one to give to each woman	82 00
Christmas presents, given in lieu of allowing slaves to grow a crop	175 00
Annual average outlay for iron and wood work of carts and wagons	100 00
50 sacks of salt	80 00
1 tun of plaster	7 00
100 barrels of lime	187 00
Annual average expense of repairs of gins and belts	80 00
400 gallons of molasses	$100 00
3 kegs of tobacco	60 00
2 barrels of flour	10 00
Freight and commission, $\frac{5}{8}$ c. per lb. on cotton	2,069 60
Making	$6,791 48
To this add interest at 7 per cent. on valuation :	
$63,000 for land	$4,410 00
88,900 for slaves	6,228 00
3,720 for mules, etc.	260 00
2,000 for cattle	140 00
1,000 for hogs	70 00
Total	$17,894 48
Sales of produce of the plantation :	
331,136 lbs. cotton at 7 c.	$23,179 52
13,500 lbs. bacon at 5 c.	675 00
Beef and butter	500 00
100 bushels of corn	50 00
1,000 bushels of corn meal	500 00
80 cords of tan bark at $6	480 00
Blacksmith work	100 00
Mutton and wool	125 00
Total	$25,509 52

This gives a profit of $7,615 04.

Col. Williams owns 10,000 acres of land, but only estimates in the above calculation what belongs to the cotton plantation. The following are the estimated values:

4,200 acres of land at $15	$63,000 00
254 slaves at $350	88,900 00
60 mules and mares, and 1 jack and 1 stallion, at $60	3,720 00
200 cattle	2,000 00
500 hogs	1,000 00
23 carts and six wagons	520 00
Plows—60 bull-tongue, 60 shaving, 25 turning, 15 drill-plows, and 15 harrows.	262 00
All other tools	1,000 00
Total	$161,402 00

ANNUAL BILL OF CLOTHING PER HEAD.

12 yards cotton cloth at $6\frac{1}{4}$ cents, for 3 shirts and 1 pair of pants	$0 75
6 yards winter cloth at 40 c.	2 40
1 pair shoes and repairing	1 00
1 oil-cloth capote	1 25
A bed comforter biennially	$0 63
1 blanket	1 25
1 wool hat	50
Total	$7 78

ANNUAL BILL OF COST FOR FEEDING SLAVES (where full fed, as upon the plantation of Col. Williams, and other first-class planters.)

$3\frac{1}{2}$ lbs. of bacon a week is 182 lbs., at 5 c. per lb.	$9 10
1 peck of meal per week is 13 bushels, at 50c.	6 50
Molasses, about 1 6-10 gallons	40
Tobacco and salt	28
Potatoes, and all other vegetables, estimated	9 72
Total	$26 00

or 50 c. a week.

Upon most plantations the last three items would not be estimated, as the slave would have to provide his own tobacco, salt, molasses, potatoes, and other vegetables, out of his own crop, which he is allowed to cultivate Sundays and moonshiny nights, or from the sale of eggs, chickens, brooms, mats, coon-skins, and other merchandise. In all the estimates of number of pounds of cotton per acre, where the calculation is made upon the crop in the seed, it is generally estimated that 1,000 lbs. of seed cotton will give 290 or 300 lbs. of ginned cotton, and about 30 bushels of seed. A neighbor of Col. Williams cultivated 21 acres of cotton and nine acres of corn per hand, and made 2,500 lbs. of clean cotton per hand. The average yield per acre in that district was calculated at 800 lbs. of seed cotton. The average time of planting is about the middle of April, as severe frosty nights occur as late as that, and once we saw snow fall April 15, all day.

1089. **Ginning Cotton.**—The cotton as it is gathered from the field is dried in the sun and packed away in the gin-house, which is generally a very rough building, corresponding with barns upon new farms, and the gin is usually driven by horses or mules, working around an upright shaft, which drives a horizontal one, and often by exceedingly rough gearing, revolving a drum for the band of the gin, which must run at a very high speed. The lint, which is estimated at 30 per cent. of the weight in the seed, is blown into a lint-room, and the seed thrown out of a window, just as some farmers throw out stable manure, where it frequently lies till half its value as a fertilizer is wasted. It is sometimes used as cattle food, but is not valuable unless ground. By those who value cotton seed for the oil, or the oil-cake for feeding, the waste around the gin-houses would be deprecated. Many small farmers do not own gins, but get cotton ginned by those who work, as millers do, for toll. The bale (400 lbs.), as usually put up on the plantation, requires five yards of sacking and four pounds of rope, and occupies nearly twice as much space as a compressed bale, which is about four and a half feet long, and one and a half to two feet square. This compression is done in powerful steam presses at the cities where cotton is shipped oceanward, to save room in stowage. It is then often hooped with iron.

1090. **Cotton Seed as Manure.**—There is no doubt that cotton seed is a good manure for that or any other crop, but there is a doubt about its being an economical one, because the seed can be applied to other purposes with greater profit. If it is used for manure, it never should be, as it often is upon Southern plantations, applied in its natural condition, for then one half its value is lost. If cotton seed is used as a fermenter of compost, all its own fertilizing value will be saved, and the value of the compost greatly improved. Thirty bushels of seed mixed with 500 bushels of muck, or road scrapings, or woods-mold, with an equal quantity of stable manure, will make an exceedingly rich compost. Those who have experimented with fertilizers for cotton, think that the greater the number of ingredients in a compost the better, and that such manure is the best fertilizer that can be used for the crop. A good many cotton growers are just beginning to realize that they can not grow cotton continually upon the same soil without manure. Upon such hard-worked land it is very difficult to get "a stand;" that is, to get the young plants to live long enough to begin to grow. Upon the principle that the ashes of any plant is good manure for the same class of plants, there is no doubt that cotton seed will fertilize the next crop.

1091. **Will Cotton Culture and Production Increase?**—In the aggregate it may, but it is likely to be more diffused, both in this country and in British possessions, and that the produce of slave labor will decrease, as old plantations are constantly wearing out by the exhaustive system of culture pursued in all the cotton States. It is doubtful whether the American crop of

1859–60 will ever be exceeded. If we could be sure the consumption would increase as rapidly in the next fifty years as in the past, it would be worth while for all Northern farmers within the limit of its possible culture, to get into the business of cotton growing. We do not think the demand for American cotton will increase, because there is an immense area in other countries just as capable of its production as this. There is a belt around the earth's surface of at least sixty degrees in width, adapted in great part to the culture of cotton. Great Britain now commands capital, while China and India overflow with labor. Let Great Britain divert a few millions of this capital and but half a million of coolies to any fertile area of 5,000 square miles within this belt, and she can in a few years double her supply of cotton, and command the residue of her importation at reasonable prices. Among these spots none is more promising than Central America, where the cotton plant is perennial, and a single acre, as we are assured by Mr. Squier, yields semi-annually a bale of superior cotton. American planters are at work in India, and Africa is constantly increasing the production. The high price of 1862 has given a wonderful stimulus to production in every country but America. It has also given a stimulus to the production of fiber from other plants, as a substitute for cotton.

1092. **Extension of Cotton Culture Northward.**—Independent of all political considerations, we think that the cultivation of cotton should be extended as far northward as the plant can be acclimated, to obviate failure in the supply from one locality, from any cause whatever. Many who can grow it, never thought of doing so till after the Confederated cotton States made war upon the Northern States. The cotton planters had so long and loudly declared that cotton could only be produced by slave labor, that many in the free States believed the statement true. But the truth is, that by slave labor the planters have been able to furnish cotton cheaper than any other country; it is not because it can not be grown in other places. But here, with cheap land and cheap labor, the supply has been kept up at low prices. Unfortunately, the planters are wearing out the cotton lands with as great rapidity as the tobacco planters wore out their soil. Many plantations that once produced cotton are now barren; and if the world was really dependent upon the cotton States, the supply would certainly fail. It should, therefore, be extended northward.

The growth of cotton in Illinois and adjoining States is not a question of experiment, but one of economy. The "cotton interest" have fixed upon lat. 36°, but incorrectly, as the northern limit of growth. In Europe and Asia it is grown as far north as lat. 41° upon low lands, in warm situations. Undoubtedly the cotton plant requires deep and thorough cultivation and a long season of fine growing weather, exempt from frost, and such situations can be found in the United States as far north as lat. 40°, and perhaps higher. A rich, warm alluvial soil is best, and there is nothing in the cultivation essentially different from corn. The average yield per acre in some of the best cotton counties in Georgia was given the author by many planters at

400 lbs. in the seed, and we have no doubt but that can be exceeded in southern Illinois.

It is contended by those who profess to know, that cotton does not exhaust the soil more than flax. We do not know how it would be under the management of Northern farmers, but we do know that as cotton is now grown it is the most exhausting crop in America, and has ruined more land than all other crops together. Millions of acres of land, once productive in cotton, are now lying barren wastes, all over the Southern States. One of the principal reasons for this is, because there is no general system of rotation. The forest is cleared off, and land planted in cotton and kept in cotton till it will no longer produce a paying crop. The only shift is from cotton to corn, upon a portion of the land. It is no wonder that it wears out. In a few instances the following system of rotation has been successfully adopted. The rows of cotton are planted only one half as close as they would be upon strong land, the wide space between the rows is plowed several times during the summer, and next year the cotton is planted in that space, and the old row "left to rest." By this simple mode the yield per acre has been increased, and the field continued to produce without diminution. If cotton is ever cultivated as a crop in regions not occupied by slaves, some system of rotation will be adopted, to prevent the general deterioration of soil that takes place everywhere that cotton has been cultivated in this country. It is certain that cotton is an exhausting crop, as all white crops always are, particularly one that ripens such a large product of oily seed; and it is certain that many farmers have given up the cultivation of cotton in regions where it will grow, because it exhausts the soil, and because it requires so much labor at the very time when corn must be attended to; and that, we believe, will be the great objection to cotton growing in the free States.

1093. **Cotton from Flax Fiber.**—A good many attempts have been made to reduce the fiber of flax to such a condition that it would be a pretty good substitute for cotton; but none of the processes have been carried to such a practical result as to produce any effect upon the market, though some fabrics have been manufactured, and much good anticipated. One of the plans that promises the greatest results is breaking the texture of flax-straw by the expansive force of steam, by which the woody substance that makes the shives of the flax-dresser is loosened from the fiber, and that is left in a condition very much resembling cotton. This is effected by filling a large gun with flax and saturating it with steam, gradually raising the pressure to 160 lbs. per inch, when the gun is discharged, and the contents blown across a large room, in a great, fleecy cloud of cottony lint. The same process produces lint from many substances that if not a substitute for cotton in all its uses will be for many things for which cotton is now used. For instance, the common reed-cane of the Southern States will blow into a lint that is exceedingly well adapted to the manufacture of paper.

INSECTS INJURIOUS TO THE COTTON.

PLATE XXI.

(Page 942.)

This, like Plates XVI. and XVII., is one for careful study. The insects that often nearly destroy whole crops in the cotton-growing States, both cotton and corn, are here placed before the reader in such a perfect *fac-simile* of life, that any one may learn to distinguish them; and from seeing them as here pictured, he will naturally begin to study their character and devise ways to counteract their work of destruction. Some boy or girl may be incited, by looking at this picture, to enter upon the study of Entomology. In one case, at least, a man has grown from just such a small beginning as the study of this plate to be an eminent writer upon the science, and has done much to instruct others in the history of insects injurious and beneficial to agriculture. We hope this may have a like effect upon some of the readers of this book.

SECTION LVII.—SUGAR-CANE CULTIVATION.

WE shall give in this section some interesting facts, gathered from personal observation about the year 1849–50, showing the magnitude of the sugar-making business in Louisiana, and the profits of well-conducted plantations. The cultivation of the true sugar-cane, *Arundo saccharifera*, is confined to a very small portion of the Gulf States (though it will perfect itself as far north as latitude 32½°), and we shall therefore only mention a few facts connected with its growth and manufacture. We have already spoken of the Northern sugar-cane, *Sorghum saccharatum*, which bids fair to render the farmers of the Middle States quite independent of the Southern sugar producers.

1094. **Sugar Production in Louisiana.**—The census of 1840 gives the total production of sugar in the United States (nearly all in Louisiana) at 119,995,104 pounds; and in 1849, by census of 1850, at 247,577,000 pounds. That year we visited many sugar plantations along both sides of the Mississippi, and on Bayou La Fourche, and from our memorandums taken from statements of planters and overseers, or from the books, we will give a few statistics that will show the product per acre, or rather *arpent*, as all measurement of land in that section is given in French measure—*i. e.*, 118 arpens equivalent to 100 acres.

1095. **Statistics of Louisiana Sugar Plantations.**—We will take some large plantations, including that of the Right Reverend Bishop of Louisiana, Major-General in the Confederate Army, and give their acreable productions, and number of hands employed to produce the crop, and in most cases a considerable portion of the corn required. And first, Bishop Polk's place of 2,500 arpens, which lies 23½ arpens wide on Bayou La Fourche, above Thibodeauville, and extends back four and a half miles. The crop of 1848 was 600 arpens of cane, 200 ditto of corn, and 200 arpens more cane land prepared. The yield of sugar was 720 hhds. from 470 arpens of cane, manufactured one year, and 510 hhds. from 358 arpens. It may be well to notice here, that all the cane grown is never rolled (the term for grinding for sugar), as about 25 per cent. has to be saved for seed, as one planting only lasts about three years. The yield of molasses is about 60 gallons to each hogshead of sugar. From seven acres of "first ratoon" cane 21 hogsheads of sugar were made in January, 1849. That is considered a first-rate crop. A lot of cane, weighed and crushed, and juice measured, gave 163 gallons of juice, 8½ lbs. per gallon, 1,386 lbs. to 2,300 lbs. of cane. The crop of corn the same year was 10,500 bushels, which was 5000 bushels less than was required for the stock, biped and quadruped, on the plantation. The average yield of corn was 26 bushels per acre. The working force of the place was 115 field hands and mechanics, and 70 mules and horses. The total number of slaves was 370. The small proportion of field hands was owing to the fact that the slaves were an original stock, imported, in 1697, for Thomas Pollock, an ancestor of Mrs. Polk, and have been in the family ever since, and now include a large number of superannuated men and women, some of them over a hundred years old. There were also 70 children under ten years of age. There is a historical anecdote connected with the slaves on this plantation. The original stock was brought into Bristol, R. I., and, probably owing to the same cause that decimates slave cargoes of the present day, the captain found that he had not enough to fill his contract with Mr. Pollock, and so he enticed some Indians on board, and immediately set sail for Edenton, N. C., and delivered his cargo at the full count. Traces of this admixture of blood are still plainly visible in this old Pollock stock.

All the clothing of the slaves is manufactured from wool and cotton on the plantation; and all the hoes, spades, plows, carts, wagons, harness, shoes, etc., as well as hogsheads and barrels for the crop, and all the carpenter and blacksmith work, is done by slaves, the rations of which are, to each adult, twelve quarts of corn-meal and three and a half pounds of pork a week, and the total annual cash expenses $8,000—generally estimated at $100 per field hand—and the total value of the plantation, with all its stock and fixtures, was estimated at $400,000, and cost, seven years before, without any slaves, for 1,800 arpens, of which 450 were cultivated, with 15 mules and 6 oxen, and the tools, $100,000. The cane is ground in a three-roller mill, driven by steam; the rollers 2 feet 3 inches in diameter, and 5 feet 6 inches long; the juice is boiled in sets of iron kettles, and requires two and a half cords of wood to a hogshead of sugar.

A few miles above Bishop Polk's plantation, on the other side of the bayou, which is a narrow stream that looks like an artificial canal, and is kept in place by embankments, is the plantation of Thomas Pugh, one of the best sugar planters of Louisiana. He went there from North Carolina in 1825, with a small force, and began a new place, or nearly so, which, in twenty-four years, grew to the following dimensions, and capable of producing the following crops: There were 3,000 arpens of land, about one third of it cleared, 550 arpens in cane, 250 in corn, and 200 in pasture, roads, lots, etc. The uncleared part was mostly cypress swamp, which afforded fuel and timber for the plantation, and lumber for sale. Most of the swamp land, like millions of acres in Louisiana, can not be cultivated unless drained by machinery. This place had 200 slaves, and worked 80 field hands, and made 700 hogsheads of sugar, and 60 gallons of molasses to the hogshead, from 440 arpens of cane rolled. All the corn required was also made on the place, which would yield, if well tended, thirty flour barrels full of ears of corn per acre. The team force required on this plantation is sixty mules, with appurtenances very complete, and one of the best kind of sugar-houses, and a short distance to haul the cane to the mill, and still shorter to haul the proceeds to the steamboat. The land is 17½ arpens front on the bayou, and 80 arpens deep—28 arpens being a mile. The sugar-house is 40 by 340 feet, with steam-engine and three-roller mill, each 2¼ feet diameter and 5½ feet long, which crush and squeeze the juice out of the cane so as to reduce it to about one third its weight.

The estimated value of this plantation was given by the owner as follows: 1,600 arpens of land (1,000 cleared), capable of being cultivated without machine draining, at $50 an arpent, $80,000; 1,400 arpens of swamp land, at $1 25, $1,750; the mansion house, at cost, $30,000—$111,750; 201 slaves, at an average of $400, $80,400; 60 mules and horses, at $100; 6 yoke of work oxen, at $40—$6,240; 1 wagon, $75; and 16 carts, at $50; plows and other plantation tools, $2,000—$2,875; 10,000 bushels of corn in crib, at 40 cents, $4,000; lumber, small stock, and movables, $1,000;—total, $206,265.

ANNUAL EXPENSES OF THE PLANTATION.

Overseer's wages, $1,200; saw-mill and sugar-mill engineer, $700	$1,900
Average annual outlay for mules	1,000
Cloth for negroes' clothes: cotton, $850; woolen, $444; blankets, $200; shoes, $475	1,919
225 barrels of pork, at $10; 50 barrels of flour, at $4 50	2,475
Average annual expense of plows, carts, spades, hoes, chains, harness, nails, and iron	900
Average annual expense of repairs of engines, sugar-mill, and kettles	200
Hoop-poles, $200; oil, $175	375
Physician's annual bill and medicines	350
Incidental average annual expense of sundries not enumerated above	200
Total	$9,419

The proceeds of the crop the year under consideration might be estimated as follows: 700,000 lbs. of sugar, at 5 cents, $35,000; 42,000 gallons of molasses, at 18 cents, $7,560—total receipts, $42,560. Net balance, $33,141.

Yet this is one of the most liberally managed plantations in the State; the slaves being full fed, with three quarters of a pound of pork a day, and twelve quarts a week of corn-meal, besides all the vegetables they can grow for themselves, or that can be produced by a man and wife and mule employed for that purpose. Besides this, they have fifty barrels of molasses and nearly fifty barrels of flour a year. Their annual clothing is 4 cotton shirts, 2 cotton pants, 1 cotton and 1 woolen jacket, 1 woolen pants, 1 woolen hat, 1 woolen blanket, 3 pair of shoes, 1 straw hat; and to the old, or invalids, 2 woolen shirts; and 1 calico dress and handkerchiefs to women, besides extras to house servants.

Other plantations produced, about 1850, as follows: On the Mississippi, 25 to 40 miles above New Orleans: Wm. Polk, 90 slaves; 55 field hands; 320 arpens of cane, 285 rolled, made 525 hogsheads of sugar and 36,000 gallons of molasses.

Thos. Way, 75 slaves; 35 field hands; 350 arpens of cane, 230 rolled, made 350 hogsheads of sugar and 700 barrels of molasses.

Col. Manning, on one of his places, rolled 75 acres, and made 140 hogsheads.

On Bayou La Fourche: Gen. Martin; 37 field hands; rolled 256 arpens, and made 335 hogsheads.

J. W. Tucker, 115 slaves; 80 field hands; rolled 500 arpens, and made 540 hogsheads of sugar and 28,800 gallons of molasses.

Geo. D. Davis rolled 150 arpens, and made 160 hogsheads of sugar, which was nine hogsheads to the hand, but expects to average twelve.

Jas. Tucker, 130 slaves; 70 field hands; rolled 300 arpens, and made 230 hogsheads.

A. McCollum, 42 slaves; 24 field hands; rolled 120 arpens, and made 153 hhds. one year, and next year 131 arpens, and made 174 hhds. His opinion is, from careful observation, that the sugar crop of Louisiana averages per annum about four hogsheads per hand. A sugar-house to make eight hogsheads a day, cost $5,000; has a steam-engine of 11 inch cylinder, $3\frac{1}{2}$ ft. stroke, driving three iron rollers 4 ft. long, 2 ft. 2 in. in diameter. Four kettles of 44 to 66 inches across, are not sufficient to boil all the juice that the engine and mill can make. Plantation expenses, $4,800 last year; but sold besides the sugar crop, $3,300 worth of lumber and 300 cords of wood, at $2 a cord.

J. N. Tanner, on Terrebonne, 60 field hands; rolled 300 arpens, and made 260 hhds. one year, and 460 the next.

Doct. Beatty, 92 slaves; 50 field hands; 500 arpens in cane; rolled 270, and made 200 hhds. Some land yielded 800 lbs. and some 1,300 lbs of sugar per arpent.

Mr. Potts, 60 slaves; 30 field hands; rolled 150 arpens, and made $143\frac{1}{2}$ hhds.; and next year 150 arpens, made 150 hhds. and molasses, 25 gallons to the hogshead.

Other plantations on the Mississippi, above Bayou La Fourche, show the fair average production of the sugar lands of the State.

Henry McCall, 200 slaves; 100 field hands; 637 arpens of cane; 510 rolled, made 1,015 hhds. of sugar and usual quantity of molasses, which does not vary much from an average of 60 gallons per hogshead of sugar.

J. R. Thompson (91 miles above New Orleans), 180 slaves; 100 field hands; made one year 640, and next year 660 hhds. from 450 arpens.

Doct. Stone, 86 slaves; 50 field hands; rolled 220 arpens, and made 342 hhds., and next year from the same number of arpens made 387 hhds. and 80 gallons of molasses to the hogshead. His average in former years from about the same area of land has been 450 hhds. The average yield of corn is 18 to 20 bushels an acre.

Daniel Hickey, 52 slaves; 28 field hands; 180 arpens rolled; made 300 hhds., and last year the same quantity from 160 arpens, besides making more corn than was needed.

Robert Richard, with 23 hands, and 18 extra in the rolling season, made 228 hhds. from 200 arpens one year, 310 another, and 210 another year.

The next two places are below Baton Rouge, on that side of the river; the first being one of the oldest American plantations in the State, owned by Col. Hickey, 80 slaves; 35 field hands; 240 arpens, made 264 hhds.; next year 250 arpens made only 143 hhds. Has made sugar 35 years, and cotton 25 years before, on the same land.

F. D. Conrad, 200 slaves; 80 field hands; 375 arpens, made 537 hhds. The year before made 410 and lost 100 hhds. by breaking the mill. On the new land of this place corn averages 30 bushels per acre, and old land about half as much. On this, and other plantations, where the proportion of molasses is not given, it may be estimated at 60 to 80 gallons to the hogshead of sugar. Judge Chinn, above Baton Rouge, made 595 hhds. of sugar, and had 12,000 measured gallons and 39,000 gallons calculated by weight, at 12 lbs. per gallon. This gives over 94 gallons of molasses to each hogshead of sugar. Another place east of Baton Rouge, and away from the river, 100 acres of cane gave 130 hhds. of sugar and 11,000 gallons of molasses, which is nearly 85 gallons to the hogshead.

1096. **Average Yield of Sugar per Acre.**—The average yield of sugar upon the above-named plantations upon 6,835 arpens of cane rolled, is one and four tenths hogsheads per arpent. Reducing the arpens to acres, it makes 5,792 acres, and the average yield $1\frac{65}{100}$ hhds. per acre. If we estimate an average yield of 70 gallons of molasses to the hogshead, it gives $115\frac{1}{2}$ gallons to the acre, to be added to the sugar as the salable crop of an acre.

1097. **Average Yield of Sugar per Hand.**—The average yield of sugar to each field hand employed upon the above plantations, appears to be about six and three fourths hogsheads, and at the estimate of 70 gallons per hogshead, $472\frac{1}{2}$ gallons of molasses per hand. Counting the sugar at five cents a pound, 6,750 lbs. at 5 cents is $337 50, and molasses at 18 cents a gallon, $472\frac{1}{2}$ gallons, $85 05, making a total cash value of the products per hand, $422 55 per annum.

1098. **Making Plantation Refined Sugar.**—Upon a considerable number of the sugar plantations of Louisiana refined sugar is made directly from the cane. This we found the case upon the plantation of J. P. Benjamin, who averaged the year we were there, 300 lbs. of first quality refined sugar from 400 arpens of cane, which was considered only about one half the capacity of the place, which had 140 slaves, 80 of whom were field hands, and eight white men, mostly Germans, were employed in the refinery. The juice of the cane is boiled in vacuum, that is, in closed boilers, heated by steam, and a charge makes from three to four thousand pounds of sugar. The molasses that drains off is re-boiled, and partly granulated, and drained again, and the molasses boiled a second time, making a poor quality of sugar, but still leaving a portion of molasses that will not granulate, estimated to average ten gallons to every thousand pounds of refined sugar. There are a good many plantations that boil the juice in vacuum, making a grade of sugar much like what is known generally as "coffee crushed," not carrying the refinery process any further. Others, like Mr. Benjamin, go through all the processes known to the best sugar refiners. On the west bank of the river, above New Orleans, we visited the plantation of a Monsieur Lapice, who worked 120 field hands, and had 750 arpens in cane, all of which he manufactured into refined sugar, making from a million to a million and a half pounds annually. His sugar-house and refining apparatus are very extensive and costly. He estimated the value of the plantation, which covered some 1,700 arpens of cleared land and 2,000 arpens uncleared, and 220 slaves and other stock, at half a million of dollars. The annual consumption of corn upon this place is 18,000 bushels.

SECTION LVIII.—RICE—ITS CULTIVATION, PRODUCTION, AND PREPARATION FOR MARKET.

WE do not speak of rice because we suppose its mode of culture will be practically beneficial to Northern farmers, nor because those who grow it will greatly benefit by our statements, but because it is one of the great Southern staple crops, and therefore all facts connected with its production should be historically interesting to all agricultural readers, though they never expect to grow this grain as a farm crop. The facts which we give in this section are such as could not be obtained at the time of this writing—January 1, 1863; for they were gathered by personal intercourse with some of the great rice planters of North and South Carolina, Georgia, and Florida, at a time when a Northern man was not looked upon as a bitter enemy; and they are now interesting to Northern farmers, just as their mode of cultivation is to Southern planters.

1099. **Rice—Where and How Grown.**—Rice is grown in nearly all tropical climates, and is supposed by some to be a tropical, sub-aqueous plant. This is an error in both particulars. It not only grows a fair crop upon dry land, but is also a valuable one to cultivate in temperate climates, quite as far north as cotton; though where it is grown as a crop, as it is along the coasts of the Carolinas, Georgia, Florida, and other States, land is usually selected that can be flooded with fresh water, partly because such land will grow rice, and would not grow any other valuable crop, and partly because, by the overflow of the land in flood-time in the rivers, it is kept continually manured. The preparation of some of these lowland rice fields is very laborious. The swamp is divided into small compartments, say twenty acres in a square, surrounded by a main ditch, and subdivided by smaller ones. Some of the main ditches are boatable canals, two or three miles in length, in a straight line from the river to the high land. Each plantation is surrounded with a strong embankment, high enough to keep out floods, and each compartment is embanked so that it can be flooded without interfering with the adjoining one. The most favorably situated plantations are upon rivers so near the sea that the tide raises the water high enough for flooding the fields, and yet so far up the stream that the water will not be salt. Sometimes the lowland planters suffer very severely in consequence of streams being so low that the salt water sets back above their rice fields just when they want the water the most. Rice was introduced into Virginia by Sir William Berkley, in 1647, and into South Carolina in 1694; and in 1698 sixty tuns were shipped to England, doubtless in the rough state, in which condition it is called "paddy." Upland, or mountain rice, was introduced into South Carolina in 1772, and is still profitably cultivated, as we know it has given sixty bushels per acre.

The cultivation of rice in Louisiana commenced in 1718, but it has never been carried to such an extent as with some of the great rice planters of South Carolina and Georgia. Along the Mississippi the rice fields are watered from the floods of the river, which rise higher than the level of the land. This is extremely convenient, but not always reliable. When the flood continues to increase from the first of February to the first of June, and then gradually subsides, the rice planters can use the water to advantage; but objections are made to tapping the levee, on account of risk of a crevasse, and because adjoining planters who grow cane are sometimes injured, as the water of the river fills up the swamps in the rear, and hinders the drainage of dry lands.

1100. **Statistics of Rice Plantations.**—These we propose to give as we have cotton and sugar, and commence with that of ex-Governor Wm. Aikin, a celebrity in South Carolina history, and a large rice planter upon the island of Johasset, adjoining Edisto, some 25 miles south of Charleston. Our visit to this island was in 1850; it had then been owned by the Governor about twenty years, and had 700 slaves engaged in rice cultivation. The island contains 3,300 acres, 1,500 of them in rice; 500 in corn, oats, and potatoes; and perhaps 200 or 300 in yards, lots, roads, and pasture ground, and the remainder in swamp, or tide-water marsh. Gov. Aikin valued the island as follows: Rice land, $100 an acre; upland, $25 an acre; swamp, nothing. The upland is very sandy, and when planted in corn, two stalks in a hill, four by five feet, it yields about fifteen bushels an acre, if well manured. In sweet potatoes, it yields 200 bushels, and the swamp land, when dry enough, sometimes yields 400 bushels. Within a few years past, part of the work upon this place has been done by plows; and steam-driven thrashing and winnowing machines have been substituted for hand labor. The fuel used for the engine is rice straw. The hulling is done by a tide mill. The rice ground is laid off in compartments of twenty to forty acres, and is mostly cultivated by that great, awkward, heavy, square tool, with a handle six feet long and one and a half to two inches diameter, known as the "nigger hoe," which is the tool in almost universal use in all slave States. In preparing rice lands, the stubble is burnt off, or hoed under, during the winter, and the land hoed up in beds in March, and the seed sown about the twentieth of that month, at the rate of three bushels per acre. The ditches, which serve to irrigate and also to drain the water from the rice, are all laid off upon this place exactly thirty-five feet apart, and all the plots being of a given size facilitates the evenness of sowing the seed by the negroes. Many of the canals are boatable, and are used to bring the crop to the thrasher and take the grain to the hulling-mill. From thence it is put directly on board the Governor's vessels and sent to market. The average crop is 1,500 to 1,800 casks of 600 lbs. each. The average sales for some years had amounted to $25,000, and the annual expenses to $10,000—$2,000 of it to the overseer. The provisions of the negroes are generally made on the place, and consist of corn, rice, and sweet potatoes, with an occasional taste of meat-soup. During the potato season, the weekly rations are half a bushel of sweet potatoes; at other times, six quarts of meal or broken rice. All the negroes work by task, and in the time thus gained, reclaim portions of the swamp, upon which they produce little crops on their own account, the master giving fifty cents a bushel for their paddy—the name of rough rice before being hulled. In cultivation of the great rice crop, each hand is allotted five acres; and one field that we took note of, eighty acres yielded 5,100 bushels, averaging 46 lbs. per bushel, and this made 229 casks of whole or "merchantable" rice; and two casks of broken rice, called "middlings;" and two and a half casks of "small (broken) rice." The team force upon this plantation is usually forty horses and mules, and twenty oxen, but neither brute nor human force is always worked to the best advantage, notwithstanding the owner is one of the most intelligent, progressive planters in the State. This we judged from seeing two hundred able-bodied men and women in one gang, repairing a breach in an embankment, by carrying dirt half a mile, in baskets, wooden trays, and boxes, on their heads, each load containing about a peck of dirt.

About forty miles by water, up Cooper River, we visited the rice plantation of Col. Carson (since dead), who owned 3,300 acres of land, one third of it in cultivation; the other portion, part swamp and part "piny woods," not worth cultivating. He owned 220 slaves, 120 of whom rated as hands, and included carpenters, coopers, blacksmiths, millers, etc. His crop was 650 acres of rice; 90 acres of sweet potatoes; 26 acres of oats; 180 acres of corn; the whole entirely cultivated by hoes, and with the exception of boating part of the crop, everything was moved by hands and heads. The thrashing was done on the ground by sticks, not flails, and the winnowing in the free air of heaven, until recently when a steam mill was erected for the purpose. The negroes, however, still pursue the ancient way with their own crops; and we saw more than a hundred thus employed one Sunday around the thrashing-floor. They also hull their rice by the plan once universal, that is, in great wooden mortars, where the rice is beaten by hand with a pestle, until the hull separates from the white grain. The general crop of the plantation is hulled in a large tide-water mill. Corn is planted from March 20 to April 20, and is ripe in August, and harvested in October, and yields 15 bushels an acre. Oats average 20 bushels an acre. Sweet potatoes are planted, say 20 acres of roots, from March 15 to April 15, and 70 acres of slips, some of them as late as July. The average yield is 100 bushels an acre. From October 1st to February 1st, the slaves are fed exclusively upon potatoes; afterward a peck of corn, or a peck of broken rice a week is given. Col. Carson said he never gave meat rations—did not believe in it, and thought his people would not eat bacon if given to them. They were required to pound their corn for meal, because "it keeps them out of mischief." The rice crop is planted about March 20, six acres to the hand, and the largest crop ever made was 45,000 bushels, averaging 45 lbs. per bushel. Rice weighing 48 lbs. per bushel is considered very heavy. The average per acre among Cooper River rice planters, take one year with another, Col. Carson estimated at 50 bushels. Twenty bushels of good rice will make a cask of hulled rice, wt. 600 lbs., and 2½ per cent. of broken rice, besides a quantity of meal which is good pig feed. His best crop was 90 bushels per acre, and his average yield per hand six casks and three quarters, or, say, 4,000 lbs. of marketable rice, worth about three cents a pound. All the food is made on the plantation, and the cash expenses only about $5,000 a year, including $1,000 for overseer, and $300 for engineer. In preparing rice land for a crop, three hands will turn an acre a day. The ditches on this place are 75 to 100 ft. apart, and most of the ground was made at an immense labor out of timbered swamp. It is flooded by the tide, but some of the plantations on Cooper River have fresh-water reservoirs.

Thos. D. Mears, of Wilmington, N. C., had a rice plantation on the Cape Fear River, where the tide averages about five feet, giving a good overflow to some 3,000 acres of rice land in the vicinity of Wilmington, which produces some 150,000 bushels of rice a year, of superior quality. Mr. Mears' average was 55 bushels per acre, upon 250 acres, worked by forty hands, who do all the work with hoes. The average crop on the river is 50 bushels, and average price eighty cents a bushel for paddy. Hands average five or six acres each, besides making a provision crop. Mr. Mears' father made one year an average of 113 bushels an acre upon a flat of eleven acres.

1101. **Flooding Rice Land.**—As soon as any one of the inclosed plots of a plantation is seeded, the water is let on so as to just cover the surface, and kept on till the grain is sprouted, and then it is drawn off till the plants shoot the fourth leaf, and then the hoes are put to work weeding, if the weather is dry, and the water is kept off till the second weeding, or else it is flooded and kept on fifteen or twenty days, which kills a great portion of the weeds. Then the water is drawn off and the crop cleaned, when it is flooded again, and the height of water regulated day after day, so that the plants just keep their heads out of water. A crevasse, or low flow of fresh water, or high salt tides, are equally fatal to the crop. Watchmen are kept day and night on the embankments, to guard against accidents. It is a crop that an enemy might easily destroy. A single gun-boat could ruin a million of dollars' worth of rice in the run of one night on a river lined with rice plantations. The rice crop ripens the latter part of August, when the water is drawn off, and the grain cut with sickles, bound into sheaves, and "toted" to the canals, or out upon dry land and stacked. Some years, the state of the weather is such that little or no hoeing can be done to the crop. Water is then the sole dependence. Upon "Rice Hope" plantation, above Col. Carson's, a crop of 90 bushels an acre was made one year upon 15 acres, never touched with hoes after planting. That plantation has fresh-water reservoirs, but the water is not as enriching as flooding from the river. These ponds cover 100 acres, to water 260 acres of rice land. But this is considered no loss, as none but rice land, and just enough upland for corn and potatoes is valued, no matter what the area of the plantation.

1102. **How Rice is Hulled.**—There is no grain, not even oats and buckwheat, that has such an uneatable appearance as rice. The delicious white grain that comes to us is inclosed in a hard, rigid husk, composed in great part of silex, so sharp that it would wear out the teeth of an ox in a short time. To remove this husk without spoiling the grain is a difficulty that ingenuity has overcome. The first process was rubbing between two stones, and then pounding in a wooden mortar; a process that commerce could not wait upon. The principle is still the same, but improved by machinery. The paddy is first run through a fanning-mill; then through a three-way separator, the screens of which take the largest rice to one place and smallest light rice to another, and the sand to a third; then through a burr-stone-mill, set so the grain is rubbed and most of the hulls separated; then it is elevated and passed again through a fanning-mill that winnows out the loose hulls. Then it is carried to a screen that separates the hulled grains from the others, which have to pass again through the mill. The hulled grain now has a rough, dirty appearance, and if eaten in that state would have a slightly gritty taste. It is not in a merchantable condition. To make it so it is carried to a set of mortars, ten or twelve in a row, each holding five bushels, where it is operated upon two hours by a large wooden pestle that is lifted up by cogs on a wheel and allowed to drop its weight into the mass, giving a rubbing motion that separates the pellicle, and mashes all the soft, defective grains, and those that were not hulled by the stones, making them into "rice meal." Then it is again elevated to a screen that separates all the whole grains from the broken ones and meal. The broken rice and meal are carried to a fanning-mill that separates them—the broken grains being good food, and worth half price. The whole grains are carried to another machine where all the dust is brushed off, and the grains polished by rubbers. It goes once more to the fan and screen, and all that comes down in the right place is ready for packing, and all that goes over is sent back to the mortars.

1103. **The Product of Clean Rice from Paddy.**—The proportion of salable rice in a given quantity of paddy may be seen from the following statement of a crop sent from "Rice Hope" to Charleston, to be hulled on account of

PLATE XXII.

(Page 953.)

A GREAT many readers of this book have never, probably, had an opportunity to see the plant here so perfectly represented in a growing state. To all it is worthy of attention as a matter of curiosity and information. To those about to embark in the business of tobacco culture, it is valuable, because it illustrates so beautifully what we have said in the section treating upon this subject. Here he will see the plant in all of its different stages of growth, from the small bunch of leaves when taken from the seed-bed to the perfect plant beginning to bud and ready to top, after which it will begin to throw out suckers, as seen upon the opposite corner. The full-grown plant in the center shows how it looks when permitted to bear seed. The section of one of the poles, or lath-strips, from the curing-house shows how the bands are fastened, as we have described, one upon each side, connected by twine.

The tobacco curing-house should have been called a shed, as the curing-house, or barn, is made with close sides; but this for an illustration of the mode of curing, gives a better view, and in a dry climate is preferable to the building with closed sides and windows, as the tobacco requires a great deal of dry air to cure without injury.

THE TOBACCO PLANT.

SHOWING ITS DIFFERENT STAGES AND THE PROCESS OF CURING

The Plant with suckers

The Plant and Root growing

The Plant Full Grown

The Plant ready for Topping

The Plant Set and growing

The Plant without Suckers and ripe for cutting

The Plant Strung for Curing.

TOBACCO CURING HOUSE

the planter: "2,159 bushels, average 45 lbs.—97,155 lbs. made 54,222 lbs. of whole rice, which sold at three cents a pound, which, with casks 50 cents each, made $1,671 16. One cask of middling 628 lbs. at $1\frac{5}{8}$ cents, $10 70; also one cask 620 lbs., not sold, say, $10 60; four casks of small rice, say, $30 00; 202 bushels of rice meal, say, $101 00. Making a total of $1,823 46. And deducting $305 34 for milling, leaves $1,518 12, net proceeds of 2,159 bushels.

It is readily seen from what we have said, that it requires a large capital to establish a rice plantation, and a good deal of hard work to keep it in order; but so long as the work can be done by slave labor, and produces such a paying crop, the business will be continued.

1104. **Statistics of the Exportation of Rice.**—By these we learn the rate of increase of rice cultivation in this country. We find that the exports from Charleston, S. C., 1724, are given at 18,000 barrels. We take it that the term barrels means tierces, for the tierces of the present day, which contain 600 lbs. each, are called barrels. In 1740 the exports from Charleston, 90,110 "barrels." In 1760, 100,000 "barrels." From Savannah, in 1760, 3,285 "barrels." The total amount of rice exported from this country in 1770 was 150,529 "barrels." In 1800, the exports are given at 122,056 "tierces;" in 1820, 88,221 tierces; in 1840, 101,617 tierces; in 1852, 67,707 tierces. The highest export any year up to the present time, 212,983 tierces. The smallest export since the commencement of the present century will probably be in 1861–2.

SECTION LIX.—TOBACCO—ITS HISTORY, CULTIVATION, AND PROFITS OF PRODUCTION.

TOBACCO may be said to be the parent of American slavery; but great as is that evil, it is not the greatest connected with its production. That is connected with the slavery to its use. We have ranked it among the staple crops of the South, because there its cultivation originated, and there is where slaves were imported to increase its production, which they did to the ruin of the soil; for it is certainly true that it is a farm production that has destroyed the value of more land than all others put together. We say nothing of health and intellect destroyed by its use, as our present province is to give facts about tobacco cultivation; but first some facts of its history may be interesting.

1105. **Tobacco History.**—The chemical composition of the plant is very remarkable, and worthy of serious study by present and prospective growers.

Nicotin, the deadly principle to which all the ill effects of tobacco are due, is, as every one knows, a deadly poison. Besides this, the plant contains a number of acids, resins, and volatile oils. The name of *Nicotin*, which is applied to this plant, comes from John Nicot, embassador from France to Portugal, in 1560, who introduced the abominable weed into Europe. So says Torrey. Its original name in St. Domingo appears to have been *chobala*, or *choba*, and also *givia*. The name *tobacco* is supposed to be derived from the name of a place in Yucatan, called Tabaco. Others say it comes from Tobasco, in the Gulf of Florida. Others say it was from Tobago, one of the Caribbees. It is not important what place gave it the name, since it has no historical nor botanical meaning. It is historical that it is an American production, used by savages, from the earliest period of our knowledge of them, as a means of producing intoxication. Columbus found the inhabitants of Cuba using tobacco in 1492. It is spoken of four years later as used in St. Domingo. It was found in use in Virginia in 1585, the natives smoking it in clay pipes, just as white men do in 1862. It was carried to England by Sir Walter Raleigh, and people became so fascinated by its use that a great demand was created, which induced the early settlers to cultivate it to an alarming extent, and its use increased in spite of all the "Counterblasts" of James I. against the "damning, wicked practice;" and so, we suppose, it will, in spite of all the blasts that we can fulminate.

The price was a great inducement to the settlers upon James River to increase the cultivation. In 1617 it is given at 37 to 75 cents a pound. Still that was not sufficient to produce all that the managers of the colony desired; for we find, in 1621, that each colonist was required to cultivate a thousand plants, averaging eight leaves to the pound, which would make 100 lbs. of the cured leaf. In 1622 the quantity made is given at 60,000 lbs. In 1639 the production had got ahead of the demand, so that the price was likely to fall so low as to stop tobacco-growing. To obviate this, the strong arm of law was made to intervene and stop the excess of production, so that the entire crop should not exceed 120,000 pounds. All excess of that was ordered burned, in equal proportions among the planters, and creditors were ordered to accept 40 pounds for every 100 pounds due. Rather "compulsory legislation" that would be considered in our day. But neither that nor all the edicts of those in power have had any effect to stop the consumption of tobacco, and therefore it will continue to be produced. The quantity consumed in England in 1829 was 15,000,000 pounds. In 1840 it was 40,000,000 pounds.

1106. **Exports and Consumption of Tobacco.**—The value of tobacco exported from the United States in 1848 is given at $7,551,122. The value of exportations has been largely increased with the last ten years, mostly to European states, where the use of tobacco is made a source of revenue; and as it is an article not at all necessary for the comfort of any human being, it is a very proper subject for taxation. The following is a statement of the consumption and tax per capita in different countries: "The average consümption in Austria was 6.75 lbs.; tax, 26 cents per head. France, 5.50 lbs.; tax, 43 cents per head. Russia, 2.50 lbs.; tax, $2\frac{1}{8}$ cents per head. Portugal, 3.50 lbs.; tax, 46 cents per head. Spain, 4.75 lbs.; tax, 48 cents per head. Papal States, 2 lbs.; tax, 50 cents per head. England, [illegible].10 lbs.; tax, 78 cents per head. Belgium, 9 lbs.; tax, $3\frac{1}{3}$ cents per head. Sardinia, 2.75 lbs.; tax, 27 cents per head. Holland, 8.25 lbs.; tax, 1 cent per head." It has been estimated that the average annual consumption of tobacco in the United States is $7\frac{6}{10}$ lbs. per head for each male inhabitant over eighteen years of age. At an average cost of only forty cents a pound, it makes an expense of over three dollars a head. It would not be unfair to make these consumers pay a war tax of ten per cent. on the cost. When it is considered that tobacco is a narcotic poison, and that its use is universally baneful to health, it is surprising that its consumption should increase in an age that is declared to be rising in the scale of intelligence and refinement. There is no disputing this fact, that the use of tobacco not only belongs to an *uncivilized* race, but that its use has a debasing effect upon civilization. The enormous cost of its consumption is perfectly startling to the political economist. The Dean of Carlisle gave the consumption of England, in 1856, at thirty-three millions of pounds, costing £8,000,000, besides what was smuggled, which he supposed a very large quantity. Statistics show there, as everywhere else, a steady increase far outstripping the proportional increase of population. In 1821, the average consumption per head per annum was 11.70 oz. In 1851 it had risen to 16.36, and in 1853 to 19 oz., or at the rate of one fourth increase in ten years. There are 12 city brokers in London whose business is exclusively the sale of tobacco, 90 manufacturers, with 7,380 workmen engaged in the different branches of the business. In the whole United Kingdom there are no less than 252,068 tobacco shops. The Dean estimated the increased consumption in other portions of Europe greater than in England, notwithstanding the great cost. In France this is enormous—equal to one thousand per cent. upon the American price, and is an imperial monopoly, which, it is said, yields $20,000,000 annually. Being a government monopoly, the quantity consumed is easily ascertained. Thus, the *Genie Industriel*, a French paper, says: "In 1830 the value of tobacco consumed was $13,000,000; in 1840 the value was $19,000,000; in 1850 it was $24,000,000; in 1857 it was $35,000,000. Taking the average at only $24,000,000 a year, it gives a total for the 27 years of $675,000,000. We give the account as we find it, but it seems almost incredible that such a sum of money could be by any one nation puffed away in smoke, or consumed in the still viler practice of tobacco-chewing. Hamburg, a German city of 150,000 inhabitants, consumes 40,000 cigars a day, and employs 10,000 persons in the manufacture of 150,000,000 of cigars a year, requiring a capital of $20,000,000. The consumption of other European states is estimated upon the same grand scale. In Denmark, 70 ounces annually for each person; in Belgium, $3\frac{1}{2}$ lbs. each; while in America the consumption is estimated by some writers as greater than in any portion of Europe, and the entire annual consumption of the world at 4,480,000,000 pounds, or as much in weight as all the grain consumed by 10,000,000 of Englishmen, and equal in value to all bread material consumed in Great Britain. Five millions and a half of acres are occupied in its growth, the product of which, at but the moderate sum of twopence per pound, would amount to the vast sum of £37,000,000 sterling, or nearly $185,000,000."

1107. **Exhausting Nature of a Tobacco Crop.**—The strength of tobacco is determined by the quantity of nicotin; the flavor, by the oils and resins. The ash is of all the most important to the farmer, for this is made up from his available plant food—in other words, from his farm capital. The oils, resins, and acids come from the air, and hence cost us nothing. Take a given quantity of tobacco and burn it to ashes, and we find that the proportion is enormous. The roots give 2 to 14 per cent. of ash, the stems dried, 16, and the leaves 17 to 24 per cent. As the leaves are the great bulk of the crop, the robbery of the soil is correspondingly great. One thousand pounds of tobacco take an average of 200 pounds of ash; and 2,000 pounds, which may be regarded as a large crop, 400 pounds of ash. Now, a crop of wheat of 30 bushels to the acre takes but 36 pounds of ash from our farm. In other words, it would require *eleven crops* of wheat to do as much injury as a single crop of tobacco. The composition of the ash is variable, in some districts one of the leading ingredients being replaced by some other. In an average of samples tested by Prof. Brewer, potash salts formed a third part of their weight, and 75 to 80 per cent. of the soluble portion. Soda exists in but a small quantity. Sometimes the potash is replaced by lime. Thus in France, along the river Garonne, the tobacco has this peculiarity, and is noted for its mildness. In American tobacco, the potash salts predominate, and most in the stronger kinds, which grow on new soil. A study of the census will show us that in any tobacco district, the production starting at nothing, mounts rapidly to a maximum, turns the corner, and never regains its higher figures. The reason is, that land can only bear maximum crops of tobacco for a short time, and when once the decline comes on, no power on earth can restore its fruitfulness. By high manuring, we can, with other crops, actually improve the fertility of our farms, or, at any rate, guard against impoverishment, but with tobacco, we can not. New crops have coarse quality of structure and rankness of flavor; while, per contra, the tobacco of the finer brands is gotten from lands long cultivated. A thin leaf, with small, pliant veins, is most esteemed, and of this character is the tobacco of Holland and Connecticut. The season of growth is ordinarily crowded into 30 days, and the larger portion of the soluble salts must be at this headlong speed supplied to the spongioles. The crop is so tender that of all those we cultivate, it is the most subject to destruction by hail. In Germany there are "Hail Insurance" companies on the mutual plan. It is a notorious fact that hailstorms extend over very limited areas at a time, and hence the farmers of a whole country uniting in small annual payments toward a mutual fund, it will be seen that even the most disastrous hail-ravages could easily be recompensed, without fear of extinguishing the grand capital. In considering the advantages and disadvantages of tobacco culture, Prof. Brewer thus stated the case. The sole advantage is that an individual may grow rich from raising it. On the other hand, a nation never will; for the one man's gain is obtained at the cost of his son and son's son; in getting his fortune he has taken from his children the means of future gain, like the owner of the goose that laid the golden eggs. The crop terribly exhausts the soil; it is very precarious because of weather and insect enemies; the laborers that cultivate it suffer in health; and the land, which must always be of the best quality, could be employed in raising breadstuffs to more general profit.

1108. **Tobacco-Growing in Connecticut.**—A letter from the small town of Cromwell, Middlesex Co., Conn., says that 50 acres of tobacco were cultivated in that town last season, the value of which is $15,000, and more than three fourths of the crop was grown within a half-mile radius, upon the loamy soil overlying the sandstone formation. The writer says:

"To this adaptation of soil in this and a few other localities in the State is attributable much of the world-wide repute of its unequaled growth of tobacco for cigar wrappers, which brings such high prices, as compared with the coarser sorts. But few persons will produce the best tobacco, and but few soils will succeed. Farmers of the old school can hardly conceive of the prodigal outlay of time, money, and labor deemed advisable by our most successful growers. Two, and often three plowings of the land, with applications of as much fresh stable manure as can well be turned in—not unfrequently ten to fourteen cords per acre—together with three to six hundred pounds of guano, and two to four bushels of salt. Its cultivation requires careful and constant attention, and judicious and liberal management, to secure a remunerative price. I wish to deter no one from entering the business, but I would have them so enter as to prove successful. The better the article raised the larger the profit. The rule among our growers for manure is, to apply all 'you can get,' which is nearer the truth than many imagine. One of our best crops was raised (as an experiment) with guano, applied at the rate of 1,400 lbs. per acre, but it only affected the one crop, which was very fine, and yielded one tun, perfect leaf, to the acre, for which 35 cents per lb. was offered and refused. Any one can figure up and see if it pays to do the business thoroughly. The gentleman raising this crop devoted his entire time to this one acre. In conclusion, I would say to any one thinking of commencing tobacco-growing, count the cost before you begin, and be content to raise a little good tobacco until you have experience sufficient to raise only the best." The best animal manure for tobacco is that of sheep, and the best way to apply it is to feed off a previous crop, say, turnips, on the ground, or yard and feed sheep where the tobacco is to be grown.

1109. **Tobacco-Growing in New York.**—From an article prepared by Hon. Geo. Geddes, of Onondaga County, N. Y., we extract some interesting facts in relation to the cultivation of tobacco in that county. He says:

"The cultivation of tobacco, as a crop, was commenced in this county in 1845, by Chester Moses and Nahum Grimes, both of the town of Marcellus. They joined in hiring a man from Connecticut, who was skilled in the culture. In 1846, Col. Mars Nearing, then of the town of Salina, grew ten acres; and very soon others engaged, in a small way, in growing this crop. By the census of 1855, it appears that in the preceding year there were grown in the whole county 471⅛ acres, yielding 554,987 lbs.; which gives as the average yield, 1,178 lbs. to the acre. Mr. Benjamin Clark, of Marcellus, who is perhaps better acquainted with the facts in regard to the culture of tobacco than any other man here, estimates the production of 1859 at $150,000." He says: "Tobacco must have a warm, rich, well-drained, and mellow soil, and then twenty-five loads of rotten barn-yard manure should be put on an acre. The land being in high condition, this amount of manure will be consumed by a crop. The plants should be set about the first of June, three feet four inches by two feet to two feet six inches apart. To grow the plants, pulverize the bed fine in autumn, and mix with the soil hog manure or some other that has no foul seeds in it. Sow seeds on the well-raked bed, as soon as the ground can be properly prepared in the spring, about one ounce to a square rod, equally distributed all over the bed. Roll hard with a hand roller, but do not cover the seed. Glass should be kept over the bed until the plants appear, which will be in two or three weeks; after they are up and started, the glass will be required only at night and in cold days. The bed should be kept moist and free from weeds. When the plants are three inches high they are large enough to set. To prepare the land, the manure should be applied as early as the ground is dry enough to plow. The last of May plow and harrow again, so as to mix the manure well with the soil. Mark the land one way for rows, three feet four inches. Make hills by hauling up a few hoefuls of dirt and press it well with the hoe. In taking the plants from the bed, take care to keep the roots wet. Unless the ground is quite damp, put a pint of water on each hill half an hour before setting. Make a hole, put in the root, and press the dirt close to it, all the way to the lower end. If any plant does not live, take care to set another. Unless the earth is wet, or at least moist, water the plants as soon after setting as may be necessary. In about one week cultivate and hoe. In ten or fourteen days repeat the operation, and continue to cultivate so as to keep the weeds down. The tobacco worms may appear about the second hoeing; kill them as fast as they show themselves. When the blossoms appear, break off the stalk, leaving about fifteen leaves, taking off about seven leaves. After topping, break off all the suckers. In about another week go over again, breaking off suckers and killing worms. In another week repeat the operation. By this time the crop is ready to begin the harvest. This may be known by the suckers which start at every leaf, and when they have all appeared down to the lower leaf, the plant is ready to cut, every sucker having been removed as it appeared. The stalks are cut at the root. In a warm day cut in the morning and evening. In the middle of a hot day the leaves will burn before they are wilted. The best way is to cut in the afternoon and lay on the ground to wilt. This wilting forwards the process of curing, and so toughens the plant as to make it practicable to hang it without much loss in breaking leaves. After wilting draw to the house, which should be twenty-four feet wide, fifteen feet high, so as to have three tiers, one above the other. A building of this width and hight, thirty-five feet long, will store an acre, or one ton of tobacco. The girts on the side of the building should be five feet apart; a row of posts through the middle is necessary to put girts in, to hold the poles that the plants are tied to. The best poles are made of basswood sawed one and one-half by four inches, and twelve feet long. The plants are handed to a man who, standing on a movable platform made by a light plank, receives them, and beginning at the top tier, he winds a piece of prepared twine around a stalk, fastening the first plant to the pole; the second plant is placed on the other side of the pole, and a single turn is made around the stalk; then again the third stalk is put on the same side of the first, the twine passed around, and the next on the other side, and so on to the end of the pole, where the twine is made fast. About thirty or thirty-six are hung on a pole, one half on each side. If this twine gives way it is manifest that they will all be let loose. The poles are put on the girts about fourteen inches apart; in this way the whole building is filled. Skill is now demanded to regulate the ventilation until the crop is cured, which is determined by examining the stem in the leaf, which should be hard up to the main stalk. Then in damp weather the tobacco can be taken down and laid in piles, with the tips together to keep it from drying, and to secure this, cover over with boards. The next thing is the removal of the leaves from the stalks, taking this time to separate the broken leaves from the unbroken ones. They are then made into parcels of of 16 to 18, called 'hands,' and are fastened by winding a leaf around them. Pile these hands tips on tips, the square ends out. This preserves the moisture. The pile should be kept covered with boards, and the sides also covered, leaving the wound ends of the hands exposed to the air. If everything up to this point has been skillfully done, in four or five days the tobacco will be fit to pack in cases, and take to market. The cases should be of pine, two feet six inches square by three feet eight inches, and of inch lumber. Place the hands tips on tips, and the wound ends against the ends of the box; press with a lever or screw until 400 pounds are in, then fasten on the top. The tobacco now goes through the sweating process, and will lose about ten per cent. in weight before fit for use. This tobacco is known in the market as 'seed leaf,' and is principally used for wrappers for cigars; the refuse is exported. A crop handled in the manner described, and with skill, will sell in New York city at from twelve to fifteen cents a pound; but from want of proper care and skill, the crop of this county does not bring an average price of over eight cents."

1110. **Cost and Profit of Tobacco-Growing.**—Mr. Geddes gives the following estimates. Cost of producing a tobacco crop in Onondaga County, per acre: The plants, $2; manure, 10 cords, $20; preparing ground $4 50; setting plants, $5; cultivation, $3 50; topping, worming, and suckering, $7; harvesting and housing, $6; twine, $1; stripping, $10; packing, $1 50; five packing-boxes, $5. The crop is calculated at a ton per acre; and that, at the average price of former years, 13½ cents, is $270; from which deduct cost of production, $66, and shrinkage, transportation, and commission, $52, it leaves $152 profit. This varies, of course, in different localities, and with high and low prices.

1111. **Rules of a Florida Tobacco-Grower.**—"Be sure to grow plenty of plants in your seed-beds. That is the first step to success. An acre requires 5,000 plants; and as one half may fail, 7,000 should be provided. Make your seed-beds on a slope, near water. Spread brush evenly, so as to give the surface a good burn, and no part too much, as will be the case if brush are piled in a round heap on the center of the plot. Rake off trash, and pulverize the soil thoroughly. Then make the ground into beds three feet wide, with narrow walks, running from the water, for the convenience of artificial watering in drouth. The narrow beds can be reached across from the paths, when necessary to thin out, or take up plants for use, as well as watch and kill the worms. If there is no rain soon after the seed is sown, the beds must be wet with a fine rose-nozzle watering-pot, and also by pouring water along the walks to soak into the beds. As soon as the plants are up, watch carefully for insects. Go over the beds every morning and kill worms. Soap-suds or weak lye will help you with the worms. Sow your first bed about March 15 [later, of course, at the north], and another ten days later, and so on, till you are sure you have enough. The seed is only one fifth the size of cabbage seed. The quantity to sow on a given space may be judged by that.

1112. **Directions for Transplanting.**—"The proper size of the plants to transplant, when they are most certain to live, is when the largest leaves are about half the size of your hand. Be careful, in drawing plants from the beds, not to crush nor bruise a leaf. Thrust the thumb and finger down so as to take hold of the root, and lay the plants upright in a basket, tray, or some convenient shallow vessel, to carry to the field. Do not crowd the plants, nor pack them so they can not be taken out by the roots, and placed gently in the left hand, with the leaves folded over the bud. Make a hole in the prepared hill with the right hand, and insert the plant about as deep as the bud, pressing the dirt well down upon the roots, so as to leave the plant with the leaves folded over the bud, standing in the center of a shallow basin. The hills should be wet before setting the plants, and directly after pour a pint of water very carefully on the hill, so as not to disturb the plant. Except in rainy days, always transplant at evening, and cover each plant next morning before the sun is hot, and uncover and water at evening, until the plant begins to grow. Expose the plants gradually, more and more, morning and evening. The best and cheapest covering is long moss. Watch and replant whenever one dies, or appears too feeble to grow, as it is very important to get a good stand. Watch for worms carefully every day under the moss.

1113. **Directions for Selecting and Preparing Tobacco Ground.**—"The best soil is that known in Florida as 'hommock land,' which is rather sandy, but rich. In black, stiff hommock land the leaf does not hold the spots well until it is ripe, and where they rot out the leaf is apt to split. To prepare for a crop, cut the timber in autumn, while in full leaf, trim off limbs and cut bushes, and spread all over the surface, to insure a good, even burn all over the field. Burn off in April; roll the logs in small heaps, and burn, and pick up all trash, and commence at once to mark off, with bull-tongue or scooter-plow, as much ground as you have plants ready for, running rows north and south. Then take the hoe, and make the hills every twenty inches to two feet, digging up the ground well about one foot around, and taking out all the roots from the hill. Make always a slight depression in each hill, as it is made, to govern the transplanting, and to collect and retain the water used in transplanting, as well as the dews and rains.

1114. **Cultivation of Tobacco—Worming—Topping—Priming.**—"Just as soon as the plants have recovered from their transplanting, commence the work of cultivation by flat-weeding, with horse and hand hoes, and with the hand smooth the dirt up to the stalk, filling up entirely the little sink made in transplanting. Remember to do this to each division of your patch or field as it comes on. Be careful, in all stages of the plant, to keep worms off of the leaf and out of the bud; first, the cut-worm around the root, then the bud-worm. In taking this worm out of the bud, be very tender, or you will do as much harm as the worm. Every two days at least, and if the worms are very bad, every day, if it can be done, each plant should be carefully wormed. Often, at an early age of the plant, the horn-worm makes his appearance. Begin soon to turn up the leaves and examine for the egg, which is semi-transparent, of a light greenish cast, and about the size of a mustard-seed. This should be mashed. Never let one of the worms live, for one horn-worm can ruin half a dozen stalks. It is not necessary to till the land as in other crops; only be sure to keep down the weeds and bushes; and when the hoe is used, care should be taken not to break, bruise, or split the leaves.

"*Topping* is the next process, which is to be accomplished as soon as the button or bud has fully appeared. This is done by taking the thumb and finger of the left hand and gently pressing back the leaves which inclose the button, and with the thumb of the right hand rolling out the button and taking off the next leaf, which would otherwise turn over the topped stalk, with its back to the sun.

"*Priming* is the term used to signify stripping off the leaves as they ripen, before the stalk is ready to cut. This is the most difficult part of tobacco-growing to new beginners. They are at a loss to tell at what stage to pull the leaves. The under leaves often ripen before the topping comes off; sometimes not until the bud comes out. To know when to prime, you must at first institute a very critical examination. Some prime as soon as the tip and edges near the stalk turn a little yellow. Bottom leaves show this appearance without being fully ripe. The most certain criterion is to find large spots about over the leaf, growing smooth underneath, and semi-transparent upon holding it to the light. When this appearance begins to come together, making nearly the whole leaf in this condition, it is fully ripe, and may be primed off. The priming must not be carried on while the dew is on the leaf in great quantities, nor immediately after a heavy rain, or it will be deficient in gum and aroma. In pulling off the ripe leaves, care must be taken not to bruise or tear the leaf, or to injure the remaining leaves. Lay the leaves in small piles along the row, under the shade of the stalk. They must be carefully carried out to the barn in trays, hand-barrows, or carts. If bruised before curing, the bruised part cures up green and worthless.

1115. **Curing the Tobacco.**—"*Splitting the Leaf.*—When the leaves are brought to the barn they should be laid on large tables, and not in very large piles, and immediately split and strung on sticks, and hung in the stalls as they are strung. To split a leaf, lay it on a smooth board for the purpose, or on the table; take a sharp-pointed knife between the thumb and fore-finger of your right hand, putting forward just enough of the blade to reach through the stem; commence about half an inch from the end, and split in the middle of the stem down toward the point, about one fourth of the length of the leaf, and lay them off in three or four different piles, according to their length, which will save much trouble in hanging and boxing.

"*Stringing.*—In putting the leaves on the sticks, fasten one end in a crack, or hole bored on purpose; then take two leaves, turn the backs together, and run them on the sticks. Serve the next two the same way, leaving a space on the stick between each pair of leaves of about two inches. String the same sized leaves only upon the sticks. The smaller leaves may be placed something closer.

"*Hanging and Handling.*—The sticks should be hung so as just to touch; and when the leaves are partially cured, close up to save house-room. Let the stalls be filled up, stall by stall, from bottom to top, and not altogether over the bottom tiers of the barn, and then carried up as it cures. 'Barn-burnt' is created by having the tobacco too close and the barn too tight, causing it to fill with the evaporating juices, which settle upon the curing tobacco, for the want of means of escape, and for the want of an influx of fresh air, causing the tobacco to sweat and lose all its gum or aroma. The barn must be watched, and properly ventilated. In wet spells the doors should be kept closed; and if one should continue too long, fires should be made outside, of bark and sound wood, and burned to coals, and the coals placed in iron vessels about under the tobacco, which will soon dry out the house. In dry, open weather the house may be kept open or shut, to suit the condition of the mass of the curing crop.

"The more of your crop you can save by priming the better; but when pushed, the last two or three leaves, ripening pretty much together, may be cut, and hung on the largest sticks with strips of bear-grass, which is very plentiful, taking care to give the stalks good room at first. This will be longer curing than the primed leaves, and will be thicker, heavier, and likely deeper colored. When the stem dries as in the primed leaf, take down, strip off from the stalk, and hand as in the other case, but keep and box it separate.

"*When to Take Down.*—As soon as the middle stem is fairly dry; when in case, that is, when it will not rattle nor break from handling, take that down which you find thus cured and in case, and make it into hands, assorting it as to quality, and tying it up with the same quality leaf, from fifteen to twenty leaves, according to size, in a hand, being careful to have the tie come out flush with the end of the stems. As you hand it, either lay it in windrows or in boxes, not packing it, however. Examine every day, to see it is not heating. If it heats it must be taken out and changed into other boxes or other windrows, and so on until it ceases to heat. If it goes through no heat in two or three days, it is ready for boxing. To pack well, the boxes should be made of well-dressed plank, three feet long, two and a half feet wide, and about two and a half feet deep.

"*Packing.*—In packing, invariably place the buts of the hands next to the box. Fill the box full, and place on the top smooth planks, that will just fit inside the box; then pack down with an ordinary lever. Manage to put about 300 lbs. in this size box; and in order to ascertain how hard to pack, weigh the empty box; then, after packing it as full as you can conveniently, weigh, and see how much you have put in. If you have in only 175 lbs., you may know you have not packed hard enough; and if you find in your box 350 to 400 lbs., you may calculate your tobacco was in too high case, and you have got in too much. In this way you may learn exactly the pressure to use. After nailing on the cover, nail on two hoops all around to every box. Cleats should always be nailed at every corner of the box when making. Be careful that the top is of seasoned timber, and thoroughly dry when put on, and do not nail it so as to make any nails enter the mass of tobacco. After all, in shipping, be careful that it does not get wet, and is not stowed in the damp holds of vessels.

1116. **Tobacco Curing House or Barn—its Proper Size.**—"The proper size of a tobacco barn is an important matter for tyros in the business of tobacco-growing. In Florida, it is estimated that a barn twenty feet square on the ground and sixteen feet high is as small as will do to save an acre of good tobacco; and to do this the tobacco must be taken down and packed as it cures. Upon this ratio, house-room must be provided for your whole crop. If your barn is a frame building, divide it into stalls four feet wide, by posts and cross-bars—the bars about two feet apart. If built of logs, arrange cross-bars of round poles as the building goes up. You must have a good roof and plenty of windows with tight shutters in the walls, and if your building is of logs it must be tightly ceiled with boards on the inside. The sticks to lay on the poles or bars to hang the leaves upon, may be split out of good pine, or any other straight rifted timber, board fashion, three fourths of an inch thick, and then split to a square, four and a half feet long, and the splinters and corners drawn off, and one end a little sharpened. About 2,500 or 3,000 sticks should be provided to the acre. In some sections, sticks made of reeds are used.

1117. **Where Tobacco may be Grown.**—The isothermal lines, within which tobacco may be grown, correspond with Indian corn, ranging from the equator to lat. 50° N., but the production at the extremes is not equal to the temperate zone, say lat. 24° to 40°. It is now grown in all the States, but most largely as a staple crop in Tennessee, Kentucky, and Virginia. The lands of the latter State have been extremely exhausted by tobacco, and so they have in Maryland, and until lately it has been supposed that all tobacco grown in a climate as cold as that north of lat. 41° was of a coarse, rank quality, but this has been proved to be a mistake by some of the tobacco growers of Connecticut and New York. True, there is a peculiar sort of sweet-scented tobacco grown in Florida, known as Cuba tobacco, that can not be profitably grown as far north as some coarser variety will grow. In Europe, tobacco is grown as far north as central Russia, and it will succeed anywhere in suitable soil, where the mean temperature of July is 65°, and some writers say 2° less. It is also said that all the varieties grown in warm regions may be transferred northward and acclimated. We believe, however, that all the good qualities will not continue to attach to the plant grown at the North.

1118. **Tobacco Soil.**—The best soil for tobacco is that which contains the most potash. Hence it succeeds best upon newly cleared forest land, and some of the fine sort grown in Florida is not worth much more than half as much in market from the third crop, as the first upon the same land. In Virginia there are many thousands of acres that give their owners rich returns when first cleared, that would not now produce tobacco enough to pay for a single plowing. There appears to be no grade of soil, from sand to black muck, that tobacco will not grow in, if the proper plant food is added; and there is no better manure than wood ashes. So fit are ashes to fertilize tobacco, that a plant bed is generally prepared by burning brush, and sowing the seed in the earth lightly, mixed with the fresh-burnt ashes. For the finest quality of tobacco we would select, in old land, a light loam, and manure it by the Connecticut rule, "with all we could get." It will grow well, as a general rule, upon all soil that is really good for Indian corn, by following the preceding rules given in this article.

In Connecticut, the plants are set June 5 to 15, and good crops have been made when they were set as late as July 5. Some cultivators set their plants on a ridge, instead of in a basin, as recommended in the article about Florida. This is for the purpose of using a horse-hoe in the first cultivation. The plants when set on a ridge are less liable to be covered up. The soil of the seed-beds must be not only rich, but very carefully worked.

SECTION LX.—FIBROUS PLANTS—HEMP AND FLAX—HISTORY AND CULTIVATION OF HEMP—COST AND PROFIT OF FLAX CULTURE.

WE are aware that neither hemp nor flax should rank as Southern crops; but they seem naturally connected, and are therefore treated of in the same section. Hemp ranks in America as a Southern crop because almost exclusively grown in slave States—that is, Kentucky, Tennessee, Missouri; though in Europe it is cultivated largely in higher latitudes than our most Northern States. There appears to be a prevalent opinion that hemp really belongs in the South, because none of the Northern States grow it as a staple crop; yet the States where it is grown are not southern, nor is the crop a Southern one, any more than Indian corn. History gives the native place of hemp (*Cannabis sativa*) in India; but if that is so, it has been acclimated much farther north; and the fact is interesting to all farmers that it can be successfully grown wherever the soil is suitable, as far north as the great lakes; indeed, as far north as they successfully cultivate flax (*Linum usitatissimum*), which has been grown in all parts of America since its first settlement, and its cultivation only ceased because it could not compete with cotton, for the want of proper machinery to cheaply reduce the fiber to practical purposes. That want is now about overcome.

1119. **Introduction of Hemp Cultivation in America.**—The first settlers of New England, New York, and Virginia introduced the cultivation of hemp, and hopes were entertained by the "mother countries"—England and Holland—that their American colonies would furnish the much-needed supply for their great navies. It was grown on Manhattan Island in 1626, and in Massachusetts in 1630. In Virginia, hempen cloth was manufactured in 1648. In 1730 Pennsylvania offered bounties to encourage hemp-growing. It was never extensively grown as a farm crop until after Kentucky was settled; there it became a staple crop at an early day, and up to the present time it has been grown in that State more extensively than in any other, though large plantations have been established in Tennessee and Missouri, but all have never been able to give enough for the wants of the country. The consumption of hemp for bagging and rope for cotton bales is enormous, and must always afford a good market for the crop and make its cultivation profitable. The consumption for maritime purposes is almost beyond the power of imagination. It is estimated that a war ship of the first class requires 180,000 lbs. of hemp to fit her for sea.* So great has been the consumption that the price has increased to such an extent that various substances have been sought for as substitutes; for instance, Manilla hemp, flax, and cotton for cordage and duck, and iron for cables, and to some extent for standing rigging, and also for cordage of cotton and other bales. Farmers who feel a disposition to engage in hemp-growing may rest assured that they will always have a sure market, and from what we have stated they will see that it can be grown in any of the Northern States.

1120. **A New Variety of Hemp.**—Within a few years past a new variety of hemp has been introduced into the Western States, under the name of Chinese hemp. The editor of the *Valley Farmer*, speaking of it, says: "We know of no new variety of vegetable production that presents such marked superiority over kinds before known to us. We visited the first extensive field of it grown by Mr. Vance, before it was generally made known to the public. In our statement of it we were particularly guarded, lest the public should place an undue estimate upon it, and suffer final disappointment as to its value, which is so frequently the case with the introduction of new things of the kind. But in this instance, so striking was the contrast between the Chinese hemp growing upon land so washed and worn that it would no longer produce the common hemp, it required only to be seen to convince the most skeptical as to its value." A writer in the *News*, of Shelby Co., Ky., says: "From the information we have of this new variety, we are fully satisfied that it must eventually supersede all varieties hitherto introduced. Having, during the present month, manufactured and examined closely samples of this hemp, we find—compared with other hemp—the lint to be more harsh, coarse, yet heavy and lengthy, giving good gloss, after being manufactured, also producing less tow, both at hackle and break; and for rope purposes we consider it equal to other varieties. For bagging and twine purposes, where a soft, silken article is preferable, it may not answer so well. The greatest benefit to the grower is in the largely increased yield per acre—double and even treble the amount of the old variety—making it a more profitable crop than 'King Cotton' itself. We have reports from a number of farmers who have experimented with it the past season. Their reports of product per acre vary from 900 to 1,400 pounds; and in one instance 1,700 pounds were weighed from *less* than one acre, the correctness of which can not be doubted. The next greatest benefit to be derived from its adoption is the greater certainty of good crops. The long time—five months—during which it is maturing, gives it the advantage of both spring and summer rains; nor does a dry spring preclude the hope of a good yield; whereas, with the old variety, you must have spring showers or no crop, as it matures in about three months. Sown in March, it ripens in September, after the heat of sunburning days is past, thereby doing away with the necessity of stacking and spreading, which is a heavy item in hemp culture. There is more wood in the stalks, making it harder to break; but when once broken or cracked, it is more easily cleaned than the old variety, the hards falling out freely in long pieces. The seed is somewhat smaller than the old variety, requiring less per acre. In cultivating for seed the yield is not so large by one third as the old kind; and ripening very late, it is liable to be caught by early autumn frosts.

1121. **Cost and Profit of Hemp-Growing.**—We estimate a hemp crop, upon good fair soil, at an average of 700 lbs. of merchantable lint per acre; and probably a fair average price on the plantation, if near water or railway transportation, is five cents a pound, making $35 an acre; and we can not count over half of this for cost of production and preparation. Some plantations, we know, average 1,000 lbs. per acre for a series of years, for all the land in hemp; and the cost of production, including a fair rent of land, would not exceed $10 an acre. This makes it an exceedingly profitable branch of agriculture. Upon some of the inexhaustibly rich bottom lands of Missouri, 1,400 lbs. per acre have often been made; and successive crops have been taken from the same land, without manure, ever since it was denuded of forest.

1122. **Sowing and Harvesting Hemp.**—The proper mode of preparing the soil is to plow it as early in the spring as possible, and the deeper the better. No doubt the subsoil plow would be extremely beneficial, as the plant has a long tap-root. As fast as it is plowed, the land should be nicely harrowed, to break up all the clods and render the surface as smooth as possible, as that is a very important part of the whole art of hemp growing. Where it is most grown in Kentucky and Missouri, the seed is generally sown in the latter part of April, the ground being re-plowed, with a lighter plow than at first, and one and a quarter bushels per acre of seed sown on the fresh soil, which should then be heavily harrowed, and afterward smoothed with a light harrow or brush-drag, so as to leave the surface quite smooth. It is important that you should know that your seed is good, for much depends upon the evenness of growth and proper thickness of plants to produce a heavy coating of fiber of fine quality. Where hemp stands too thin, the stalks send out so many side-branches that the crop is injured. If grown for seed, instead of lint, it would be advantageous to grow the stalks full of branches—that is, the female portion, as there are always male and female plants in this family, and it is the latter that incline most to branches. Hemp should not be cut until the stalks turn yellow and leaves begin to fall, as the lint does not acquire its full weight and strength until such time.

Cutting hemp is hard, slow work. A strong, skillful hand can cut an acre a day with a hemp-cradle, which is like a grain-cradle, but stronger, and scythe shorter. Many planters prefer the hemp-hook, which does not cut half as fast as the cradle, but saves more hemp; and some who grow hemp contend for the hook, because a hand can harvest with it all that he can dress during winter, which is the only season that hemp dressing can be done to advantage.

Hemp is generally ready to commence harvesting, south of lat. 40°, the first of August; and it is set up in shocks, to stand until October, when the process of rotting is begun, by spreading it upon the field where it grew, or in some grass lot, unless the planter has conveniences for water-rotting, which is generally preferred, though the rotting upon the field adds much to its fertility, and some say is sufficient to keep the land always productive.

Some planters remove the hemp from the field as soon as harvested, and stack it, and plow the land directly afterward; while others contend that this practice is injurious to the soil, and that it will surely fail sooner than it would if the stubble were left untouched until the time of spring plowing. It is true that plowing exposes the soil to the drying influence of a hot sun, like a naked fallow, to which we are opposed. Those who advocate plowing hemp stubble contend that, without it, such a grass sod would grow that, when plowed in the spring, it could not be harrowed smooth, and that much of the grass would grow, and injure the hemp crop. If it is necessary to plow hemp land after harvest, we recommend sowing a green crop, say corn, oats, rye, or buckwheat, to shade the surface and enrich the soil. It can be fed down in autumn, or plowed under, or dragged down to decay. Rotation would be advantageous, for a hemp stubble will produce good wheat, or corn, or clover, and thus extirpate the troublesome weeds and grass. It is contended by many hemp growers that rotation is not necessary on account of any exhaustion of the soil, and that the leaves of one crop produce sufficient fertilization for another crop. We have before us the notes of a Missouri hemp grower, who averaged 800 lbs. per acre eleven years in succession. The mode of estimating the yield per acre while the crop is growing is to calculate 100 lbs. of lint for every foot in hight. That is, a field that averages eight feet in hight will yield 800 lbs. per acre.

1123. **Rotting and Dressing Hemp.**—The process of water-rotting hemp in ponds or streams is much objected to in thickly-settled districts, on account of its influence upon health. It certainly is objectionable on account of the odor it diffuses; and it is not a very pleasant job for those who do the work of handling the rotted hemp, and carrying it to the field where it is spread to dry. It is resorted to because it takes a shorter time, and produces better lint. Spread upon the field like flax, it takes from two to three months to rot sufficiently. The breaking usually commences about New Year's, and requires hard labor from the stoutest hands. It is not dressed like flax, but broke, and the shives shaken out, and fibers straightened, and tied up in bales of about a hundred pounds each. The earliest rotted hemp is darkest and toughest, and more difficult to break than that which lies until cold weather. If not well rotted, the task of breaking is very severe. If too much rotted, the value of the fiber is greatly injured. The best grown hemp—that is, that grown with stalks close together, and of even size and length—affords the most fiber, and is the easiest dressed, because the wood is weak, and becomes very brittle by the process of rotting, before the fiber is injured.

1124. **Cutting Hemp by Machines.**—Some experiments have been made to cut hemp with mowing machines. Wherever they have failed, it has been because the strength of the machine was not adapted to the work, which is much harder than the stoutest grass or grain. Since machines have been adapted to cutting Indian corn, we have faith that they will be to cutting hemp as well as to breaking it, so that the limit of production will not be confined to the quantity that can be dressed in winter by the hands that grow the crop in summer.

1125. **Historical Facts about Flax.**—The most interesting fact for farmers about to engage in flax-growing is, that it is a rapid exhauster of the soil. Second, that it requires a moist soil and wet season; consequently it is a good crop for bottom lands that can be irrigated. The country of its origin is unknown, but it grows well upon irrigated land in tropical climates, and through all gradations of climate and soil to a high northern latitude. In Egypt, flax is sown in December and January and harvested in April or May, and in northern Russia it is sown in May and harvested in August; and so it is in the northern parts of the United States. Flax cloth has an antiquity much greater than Moses' account of it, for the oldest mummy wrappings in Egypt have been proved by microscopic examinations to be made of linen, instead of cotton or any other fiber. Flax was one of the necessities of cultivation by our Pilgrim fathers and other immigrants into North America, and by all the new settlers in the wilds of the country, for the lint with which their families have been clothed. Up to a period within our active participation in farm-labor, almost every thriving New England farmer cultivated a small piece of land in flax every summer, and dressed it out by hand in the barn in the dry, cold days of winter, and the family manufactured it into a variety of articles of domestic use. Indeed, a good many old-style farmers did not think they could get along without their tow frock and trowsers, nor that anything was so fit for meal-bags as home-made tow-linen. We fully believe that a great many who have abandoned flax culture because "cotton is so cheap," may safely, in an economical point of view, return, in some degree, to the ways of our fathers. We offer a few hints to this end.

1126. **Flax-Growing—Soil and Preparation.**—There is no material difference in the soil nor in its preparation for a flax crop from that already described for hemp. Both need a rich, mellow loam, made just as pulverulent as possible with ordinary farming tools, and for flax the surface must be free of lumps, clods, and stones, or there will be a great loss of seed. The crop always does best upon soil that suffers least from drouth. And although not strictly a Southern crop, it seems to come in its proper place after hemp, and therefore we give some brief facts in this connection.

1127. **Quantity of Seed per Acre, and Time of Sowing.**—The seeding of flax land varies from half a bushel to six bushels per acre, according to what the crop is designed for. Where it is sown for the seed alone, as it is in many places in the Western States, where no use is to be made of the lint, half a bushel of seed an acre is considered sufficient, and better than more; and if the ground were as carefully prepared as we have recommended for a lint crop, a peck of seed would be ample, as it would be no object to have the stalks grow as thickly as possible. Fifteen bushels of seed per acre is a good yield, and above the average, though we have heard of twenty-five bushels an acre, and so we have of many crops of less than ten bushels. The time of sowing in the latitude of central New York is as early in April as the land could be properly prepared; and if the intention is to grow the crop for both lint and seed, as the crop is most generally grown in the Eastern States, we would recommend two bushels of seed per acre. If the crop is desired more for lint than seed, the seeding must be thicker and thicker as the fineness of the lint is required. For the very finest linen threads, we are assured that seven bushels of seed per acre has been sown in Europe, and the flax pulled while in blossom.

1128. **Cost and Profit of a Flax Crop.**—The following estimate of the cost and product of an acre of flax in the Middle or Eastern States may be taken as a pretty fair basis:

Plowing and subsoiling thoroughly, and cross-plowing with one horse lightly......	$3 25
Harrowing once with ox-harrow, and once with light harrow....................	1 00
Sowing and brushing, 50 cts., and two bushels of seed, $2 00	2 50
Cutting crop by mowing machine, binding and setting up.........................	75
Carting, thrashing, spreading, handling, and storing...........................	4 50
Dressing by hand at 6 cts., or machine at 2 cts., 400 lbs.........................	8 00

—making a total of $20, or $36 if dressed by hand, and $46 counting manure and rent.

The crop we would estimate at 8 bushels of seed, average $1 a bushel, $8 00; and 400 lbs. of lint, average 12½ lbs., making $58, and the profit of a flax crop $12 per acre. Where a larger quantity of seed per acre is used, the result will not be different; for though the cost of seed is more, and yield of seed less, the value of the lint will make it up about the same. Of late years, flax has been a good deal sown for seed, and the rough straw sold by the tun at an average of about five dollars, which pays better than burning it, as has been the practice, though at that price it can not be transported far upon common roads.

1129. **Other Fibrous Plants.**—It has been stated, from some small experiments, that cotton would produce as valuable a crop as hemp from the fiber of the stalks, if the seed was sown broadcast so that the stalks would grow as closely together as those in a hemp-field. Instead of using the cotton plant for this purpose, which is only practicable south of lat. 40° to advantage, we recommend the okra plant, which makes a similar growth to cotton, and has a more fibrous stalk, and grows well as far north as New York. The whole nettle family might be cultivated for its fiber, but after all, it is doubtful whether any other plant can be profitably substituted in any of the Northern States for flax, which we know can be grown with profit to the grower, for its fiber alone, whenever he can be assured the average price of hemp, and that we think he will be assured, as soon as some of the recent inventions for separating the lint and wood have been put into general operation.

CHAPTER XV.

THE GLEANINGS OF THE FIELD.

SECTION LXI.—MISCELLANEOUS ITEMS OF USEFUL KNOWLEDGE TO FARMERS.

IN gathering the harvest that we have garnered up in this store-house for the use of American farmers, and arranging each subject under its appropriate head, we have necessarily scattered, as the reaper does, some good grain, to be afterward gleaned. These gleanings we attach to our work under the head of Miscellaneous, with strong hope that the reader will find among them enough good seed to pay for the trouble of winnowing.

1130. **Time Required for Seeds to Germinate.**—Wheat, one day; spinach, beans, mustard, three days; lettuce, four; melon, cucumber, cress, five; radish, five; beets, five; barley, seven; purslane, nine; cabbage, ten; parsley, forty; almond, chestnut, peach, one year; rose, hawthorn, filbert, two years. This is according to Loudon, but is subject to many variations, as the germination will be affected by the degree of heat, moisture, and general condition of the soil.

1131. **Temperature at which Several Plants Flourish.**—Wheat, 74° to 75°; barley, 69° to 74°; potatoes, 54° to 75°; melons, 66° to 67°; apples, 59° to 72°; tobacco, 66° to 82°; corn, 59° to 80°; sugar-cane, 71° to 82°; grapes, 70° to 80°. Whenever the temperature of the proper season for perfecting the fruit materially varies from the above, a decreased production may be expected, unless the crop is affected by artificial means. Winter grain, vines and trees, all suspend growth, and rest in winter, in all of our Northern States. Wheat requires 120 to 140 days from the time of sowing to harvest in a mean temperature of sixty-one degrees.

1132. **Storing Grain in Cemented Caves.**—It has been recommended as an excellent way to store grain, to make cavities in the earth, plastered perfectly water-tight with hydraulic cement, and of a form like a jug, which, being filled with grain, could have a cover cemented on, and thus preserve the grain for an indefinite length of time. We should like to have the air pumped out, and then seal it up, and we believe such grain-cisterns would be excellent preservatories. Farmers who are troubled with rats would find such granaries highly valuable, and they can be cheaply constructed. See article on Cisterns.

1133. **A New Grain Mill** has lately been invented, that operates upon an entirely different principle from any of its predecessors. There are no rubbing, nor grinding, nor cutting surfaces which come in contact with the grain. It is reduced to powder by blows struck upon it while suspended in air. A shaft, armed with beaters, inclosed in an iron case, is made to revolve with great velocity, and the grain, being fed into the case near the shaft, is carried out by centrifugal force, where the arms strike their rapid blows upon it, and shatter it to atoms, as a blow of a heavy iron bar, it may be supposed, would shatter a piece of glass, if hit while flying through the air; it is then blown out of the case through an orifice made for the purpose, and the bran is separated from the flour by the force of gravity; the flour, being the heaviest, is carried farthest from the machine. It is said that all sorts of grain can be reduced by this means, even corn and cobs, if any one desires it; we do not, because we do not believe that cobs will ever pay for grinding, no matter how cheap the power. But Indian corn ground in this way will, undoubtedly, be better for human food than when ground by any of the rubbing processes, which breaks the oil-cells, and makes the meal liable to rancidity from long keeping.

1134. **Nutriment in Food Substances for Man.**—The following table gives a comparative view of the value of different substances for human food, so far as their nutritious qualities are concerned. With peas and beans, some of the coarser and less nutritious substances should be taken, upon the same principle that hay or straw is fed with grain to stock. Of 100 pounds of each of the following substances, it may be assumed that the figures show the number of pounds of matter that go to sustain life or support the strength of the consumer. Thus, if 100 pounds of corn meal cost the same as 100 pounds of turnips, which is often the case in city markets, the meal will really be worth twenty-two times as much as the turnips for food.

The per cent., taking 100 as the unit, of the different articles is as follows, according to chemical analysis:

	Per Cent.		Per Cent.
Lentils	84	Oats	74
Peas	83	Meats, average	35
Beans	92	Potatoes	25
Corn (Maize)	89	Beets	14
Wheat	85	Carrots	10
Barley	83	Cabbage	7
Rice	88	Greens	6
Rye	79	Turnips	4

1135. **How to Calculate the Value of a Load of Hay.**—The following is an easy way of calculating the value, in dollars and cents, of a load of hay: If the price agreed upon is \$18 a tun, ascertain the number of pounds in the load, and multiply that by the unit 9, which is the half of the sum agreed upon, or else whatever may be half of that sum, and you will have the price of the load in mills; per example, a load contains 3,300 lbs.; multiply by 9, and it gives 29,700 mills, which is \$29 70, the amount of the load of hay at \$18 a tun. If the price is \$15 a tun, and the weight of the load 1,950 lbs., multiply by 7½, and you have 14,625 mills, or \$14 62½, as the price of the load. So any load, of any weight or price, may be quickly ascertained by this rule.

1136. **How to Calculate the Number of Plants upon an Acre.**—This is a very important matter, and is all worked out in No. 568. Look at that whenever you are about planting an orchard, or when you wish to estimate the number of forest trees upon an acre. Suppose you are selling the timber. One man offers a price per acre; another one offers a price per tree. If you know how many an acre contains at given distances apart, you can tell which offer is best. At 30 feet apart, you have 50 trees; at 25 feet, 70; and so on.

1137. **Limit of Vitality of Seeds.**—There is no limit to the vegetative life of cereal grains kept perfectly dry in an unchangeable temperature, and most of the garden seeds will grow after two years, and those of the *cucumis* family after many years. Some persons prefer melon seeds two or three years old. Onion seed loses vitality of about half the seeds the second year, and old parsnep seed is not as good as new. All garden seeds should be kept in air-tight vessels, and none but the best should be saved. Their vitality may then be counted upon as follows: Parsneps and rhubarb, two years; beans and peas, two to three years; carrot, nasturtions, mustard, parsley, and lettuce, three to four years; pepper, cabbage, spinach, tomato, turnip, salsify, radish, and egg-plant, four to five years; asparagus, celery, okra, broccoli, and cauliflower, five to six years; beets, cucumber, gourd, melon, squash, pumpkins, corn and other grains, six to ten years, and longer. The great secret of keeping seeds is to have them well matured, and kept cool and dry. It is impossible to say how long seeds may be made to preserve vitality, with proper care; but it is certain that any sort may be spoiled in any year by damp and heat.

1138. **What Ohio Produces.**—Besides its great crops, it produces men; and here is the sort its soil furnishes. E. D. Mansfield, State Commissioner of Statistics in Ohio, has submitted to the Legislature of the State his annual report for 1861. It contains some curious items. For instance, the average hight of Ohio men is given as four inches above that of the Belgians, two and a half above that of the English recruits, and one and a half inches above that of the Highlanders. The average hight per man is a fraction under five feet ten and a half inches. Highland County showed the tallest and heaviest men. Twenty-one who were weighed averaged one hundred and eighty-two pounds. Fair complexions predominate in Ohio. There are few of olive brunette, or dark complexion. The great majority are light or sanguine. The eyes are light in the proportion of three to two, including blue and gray in the light class, black and hazel in the dark. The hair is the only feature among Americans, and especially in Ohio, which approaches the characteristics of the dark nations. Even in this, the majority have what may be fairly called light hair, including most of the shades of brown hair.

1139. **Thoroughness—What it Produces.**—It produces great and good results in all the operations of the farm. He who hurries through everything generally so slights his work as to do nothing well. But we would not have any farmer thoroughly attached to routine, such as appears to govern some farmers, and never leads them upward. Farming, as well as all ancient arts, has been run down by routine. Routine is the enemy of all improvement in farming. Routine plows three inches deep, and will not go deeper. Routine plants without manure, and runs down and wears out the most fertile soil. Thoroughness, in all undertaken improvements, avoids routine, and strikes out boldly to produce a result. With some farmers, everything is done thoroughly; with others, nothing. One lives as though he hoped to live long and enjoy his labor; the other only lives for to-day. He literally "takes no thought of the morrow."

1140. **Legal Weights of a Bushel of Grain and Other Things.**—The following table, published a few years since in the *Rochester Union*, is said to give the legal weights of the substances named, so far as fixed in the following States:

ARTICLES.	N. Y.	Oh.	Pa.	Ind.	Wis.	Iowa.	Ill.	Mich.	Ct.	Mass.	R. I.	Ky.	N. J.	Vt.	Mo.	Ca.
Wheat, lb.	60	60	60	60	60	60	60	60	56	60	—	60	60	60	60	60
Rye	56	56	56	56	56	56	54	56	56	56	—	56	56	56	56	56
Corn	56	56	56	56	56	56	56	56	56	56	—	56	56	56	52	56
Oats	32	32	32	32	32	35	32	32	28	30	—	—	30	32	m	34
Barley	48	48	47	48	48	48	44	48	—	46	—	48	48	46	m	48
Buckwheat	48	—	48	50	42	52	40	42	45	46	—	52	50	46	m	48
Clover seed	60	54	—	60	60	50	—	60	—	—	—	50	54	—	m	60
Timothy seed	45	42	—	45	—	45	—	m	—	m	—	45	—	—	m	48
Flaxseed	56	56	—	56	—	56	—	m	—	m	—	56	55	—	m	56
Hempseed	44	—	—	44	—	44	—	—	—	—	—	—	—	—	—	—
Blue grass seed	15	—	—	14	—	14	—	—	—	—	—	—	—	—	—	—
Dried apples	22	25	—	30	28	24	—	28	—	—	—	—	—	—	—	22
Dried peaches	32	33	—	—	28	35	—	28	—	—	—	—	—	—	—	22
Dried plums	—	—	—	24	—	—	—	—	—	—	—	—	—	—	—	—
Coarse salt	56	50	85	50	—	60	—	—	—	70	—	50	—	—	56	56
Fine salt	56	50	62	50	—	50	—	—	—	70	—	50	—	—	50	56
Potatoes	60	—	—	60	—	60	—	—	60	60	60	—	—	60	—	—
Peas	60	—	—	—	—	—	—	—	—	60	—	—	—	—	—	60
Beans	60	56	—	60	—	60	—	—	—	60	—	60	—	—	—	60
Castor beans	46	—	—	46	—	46	—	—	—	—	—	—	—	—	—	—
Onions	57	—	—	57	—	57	—	—	—	50	55	—	—	—	—	—
Corn meal	—	—	—	50	—	—	—	—	—	—	55	—	—	—	—	—
Mineral coal	—	—	—	70	—	—	—	—	—	—	—	—	—	—	—	—

Corn on the cob weighs 70 lbs.; bran, 20 lbs.

1141. **Capacity of Boxes.**—Any farmer can make, or have made, accurate measures. Boxes made of the following capacities will contain the quantity of grain or other article of dry measure sold by the barrel, bushel, or quart. For instance, a box, measured inside, 24 inches long, 16 inches wide, 28 inches deep, gives 10,752 cubic inches, and will contain a barrel. A box 24×16, and 14 deep, 5,376 inches, half a barrel. A box 16×16.8, and 8 deep, 2,150.4, holds a bushel; and one 12×11.2, and 8 deep, 1,075.2, half a bushel; and 8×8.4, and 8 deep, 537.6, a peck; 8×8, and 4.2 deep, a gallon. The same size, half the depth, or 7×4, and 4.8 deep, 134.4, half a gallon. One 4×4, and 4.2 deep, 67.2, a quart; and half the depth, a pint.

1142. **How to Measure an Acre—Square—Triangle—Circle.**—For a circle, use a rope for a radius, 7 rods $3\frac{3}{8}$ links long. For a fourth-acre, 3 rods 14 links. For an eighth, 2 rods 13 links. An acre in the form of an equilateral triangle is 19 rods $5\frac{1}{2}$ links upon each side. A triangle eighth of an acre is 6 rods 20 links. A rod is $16\frac{1}{2}$ feet, and a link 7.92 inches. A square acre is 160 rods, 43,560 superficial feet, and is 12 rods and 10.7 feet upon each side. To lay out an oval plot, measure off an exact triangle upon the spot, and set a stake at each point, and stretch a rope around tight; then pull up one stake, and press it hard against the rope, and mark upon the earth as you go around. If you wish to form an oval, say 20×100 feet, draw a perpendicular and a horizontal line through the center of the plot where you desire to form your oval, and set stakes 100 feet apart upon the long line, and a stake ten feet out from the center on the other line. Now draw a cord tight around these three stakes, and fasten it. Then take up the stake on the short line, and press it against the line, and with the point scratch a mark all the way around, and you will have an oval of the desired size.

1143. **Axioms, Proverbs, and Maxims.**—We have always loved the little sentences that we have found floating upon the sea of printer's ink, which come under the class of axioms, self-evident truths, or proverbs—truths often repeated, in wise, pithy sayings—or maxims of established principles, and propositions generally received as true; and as we have always found mankind ready to learn truth from these little scraps, we have gathered a few that appear worth preserving. Although we address them, by their titles, to different members of the farmer's family, we hope none of them will be passed over by other members; for however trite some of the sayings may appear to the elder class, let us not forget that we were once young, when many an old saying was fresh to our minds, as some of these will be to others. Let us remember that the soundest grains of wheat are found mixed with chaff, which the skillful farmer winnows out and garners in his store-house. So let each winnow and save such grains as he may find in these pages.

1144. **Maxims for Young Farmers.**—A tyro in farming should not select an impoverished farm to begin with, lest he fail and become discouraged through no fault of his own.

To preserve fertility, as much must be restored to a field, in some shape, as the crop carried off extracted from the soil. This can be done by turning under a green crop, or applying animal or mineral manure.

Never try to cultivate more acres than you can do thoroughly. Sow none but good seed, and be sure always to sow it at the right season.

Never attempt to carry "coals to Newcastle" in any of your farming operations. That is, do not try to grow things for sale for which you have no market. Grow such things as your soil, situation, and climate are adapted to, and such as facilities of transportation will warrant. Do not try to grow apples nor potatoes at the tropics, nor oranges and yams at the poles.

Practice mixed husbandry. As a general thing, no small farmer, such as most of us are in the Northern States, can confine his operations to a single article of produce. The risk is too great. If that fails, all income for the year fails.

Be sure never to fail to plant a garden of the most useful vegetables for family use, and cultivate it well. No part of the farm will be more profitable. Plant fruits of all useful sorts, and let no tree cumber the ground that does not produce good quality.

Weeds are a pest. Do not plant the seed. Do not cart the weeds into your barn-yard, and cart the manure out in its raw, unfermented state, with every weed seed in a perfect condition to grow. If you would not be pestered with weeds, compost your manure, and kill the vitality of all seeds. Make it a law of the farm that every one shall stop and pull up every noxious weed, such as dock, thistle, Spanish needles, etc., and in a very few years your greatest pest will be gone. Walk about your farm for recreation or inspection with a staff having a hook at one end and a chisel at the other, and keep an account of the number of your enemies you slay in the course of the year, at little expense of ammunition.

Turnips will winter better in piles than in pits, and pine brush is better than straw for covering, laid but-ends up, with a few inches of dirt over.

Apples will keep if buried, but the earth is apt to extract the aroma, and thus injure the quality of fruit.

Upon land seeded to grass, volunteer oats should not be allowed to grow. If you can not feed them off, mow them.

Spend leisure hours in autumn among the raspberry plants. Cut away all old canes, and shorten new ones. Tender plants may be covered with evergreen boughs.

Trenching is simply spading and mellowing up the soil some two feet deep. It is done by digging a series of ditches parallel to each other, and throwing the dirt of one into the other. The great secret of growth of garden vegetables is not in the greater supply of manure, but in the fine pulverization of the soil. Subsoiling is of the same nature as trenching, and, as far as it goes, equally profitable.

Boulders may sometimes be got rid of by digging a hole alongside, and burying them, much better than any other way. A man will sometimes bury a stone in one day that could not be blasted and hauled out for five dollars.

Save and sow the largest seed, and by these means you will get peas, or anything else, of a bulk of which we have at present no conception.

Radishes planted in the hill with melon or cucumber seed will often save the vines from bugs, which, liking the radish plants better than the vines, will eat them first; in the mean time the vine plants grow to such a size that the bugs will not molest them.

Fumes of rosin have been found equally efficacious and much cheaper than fumes of tobacco for destroying aphides upon plants. The maggots of the asparagus beetle proved destructive upon Long Island in 1862, and the best remedy discovered was fowls. Several persons who kept chicken-coops near their asparagus beds found them an excellent protection. As the eggs of the maggots are deposited upon the seedlings, it is best to destroy them.

Peas are an excellent crop to prepare land for wheat or any other grain, and may be profitably grown as a manure crop. They may be grown for seed after the 10th of June, free from the pea-bug; and a bushel is worth a bushel of corn for fattening purposes, and it does not cost half so much to produce it.

Teazles have been grown profitably in this country. They are used by all woolen cloth dressers.

1145. **Maxims about Stock.**—A morbid appetite for animal food causes sows to eat their pigs. Feed them flesh before they drop their pigs, as a preventive remedy, and give them saw-dust instead of straw for bedding. It is good for any stable bedding.

Feed oil-cake to heifers. It enlarges the milk-vessels. Say two pounds a day, for two or three months before calving. Give all animals plenty of water.

Pumpkin seeds are good for all stock when cooked, but injurious raw. Ducks are often killed by eating them.

All food is better for all animals if cooked, but it will not always pay to cook it.

Dogs indicate the character of a neighborhood. If they are an ugly, brawling set, look out for their owners; they are very likely to be ditto; for the gentleness of all animals is generally in keeping with their masters. If one is ugly, he is only a brute; the other is brutish.

Neglect of young stock in November is one of the sins of which almost all American farmers are guilty. It may save hay, but it will be at the expense of value in flesh, and perhaps of life.

Sheep and calves should be yarded together. Sick calves often pick up and devour with avidity the hay and straw from among the sheep-dung. It is medicinal, and no article has more immediate and salutary effect in restoring diseased calves to health.

Where all fodder is dear, and labor cheap, it is good economy to cut up all the coarse materials, and coax the stock to eat them by mixing in a little meal. We do not believe that it will pay to cut up everything, and in some localities it will not pay to cut anything. It all depends upon the cost of labor and the value of fodder. Roots are better if cut, or pulped, and mixed with dry feed, for stock, but that would not always pay.

Ticks on sheep can be got rid of by keeping the flock always in good order.

Hold up your whip in driving oxen. The best ox-drivers rarely use the whip. It is a wand of office, not an instrument of torture. A driver of an ox-team should walk directly opposite to the yoke, walk straight, and carry his whip as upright as a soldier would his gun. Use a whip-stock with a short lash, and touch the cattle only with the lash, and never strike them on the nose or over the eyes. "The merciful man is merciful to his beast."

Coal ashes are good for pigs. So they are for fowls to wallow in during winter.

Castrate your lambs and pigs just at dusk, or by candle-light in the evening. The mothers then lie down, and the young animals have a night of rest.

Housing cattle will pay a greater interest upon its cost than any other outlay in farming.

Boiling corn on the cob is economical for swine feeding. It will save one fourth the quantity.

Of "condiments for cattle" beware. and of all who deal in them, as you would of any other humbug.

A good horse should have fifteen good properties and conditions, viz.: Three of a man, three of a woman, three of a fox, three of a hare, and three of an ass. Of a man, bold, proud, and hardy; of a woman, fair-breasted, quick hearing, and easy to move; of a fox, a fair tail, short ears, and a good trot; of a hare, a clear eye, a dry head, and a well-formed body; of an ass, a big chin, a flat leg, and a good hoof.

A cow is like a mill; if you put but little in the hopper, you will have but little grist. In regard to milk, manure, or beef, you can get nothing out of a cow that you do not put into her.

Every farm in America, upon which ten head of cattle are kept, would make money by expending enough to provide water in the yard both for winter and summer use. Pumps can be easily made so as to raise water whenever the cattle come to the trough for a drink. Where wells can not be had, cisterns can.

Medium-sized sheep are the most profitable; say such as will dress 50 pounds, and have a fleece of medium wool that grows thick and firm. A farm will carry three such sheep per acre; that is, a farm of 100 acres, that grows, perhaps, ten acres of corn and family vegetables, with pasture and mowing proportioned to the stock, will carry 300 head of sheep, with the family cow and necessary team. Young lambs can be taught to feed in the following way: With the three lower fingers of the right hand, clasp the right fore leg near the foot, and do the same with the left hand and left foot; then raise it up, and, holding the head of the lamb a few inches below your mouth, insert a thumb and fore finger into each side of its mouth, opening and holding it so as to let a small stream of cow's milk flow from your own mouth into the lamb's. It may strangle and struggle some, but there need be no fears of injuring it. One or two mouthfuls are usually sufficient, and these may be given in as many minutes. Be sure to give enough to make his ribs bulge some when you stand him on his feet. After a few feedings the lambs will huddle about your feet, sticking up their noses in a most amusing manner, begging to be taken up and fed." Such feeding and saving of lives will do much to multiply sheep, and thus cheapen food and clothing, two of the essential wants of life.

One of the best things in the world to make cattle handy is to treat them well in winter. Farmers should discard the word breaking from their vocabulary, and substitute that of *handying.* Never strike or frighten a steer, heifer, or colt. Handle and handy them. Gentleness will accomplish more than harsh words and hard blows. You must begin with the idea that they do not know what you want, but are willing to learn. You should give them time, patience, and good usage, and they will gladly become your faithful servants. The true secret of managing young cattle to advantage is gentleness, kindness. One little nubbin of soft corn is worth a dozen whips and sticks to make them obey. Be patient; do not hurry them. Let them have a little time to reflect, and they will prefer marching to being whipped. Animals are made vicious by bad treatment—by abuse. The same effort to be kind will secure docility and kindness in the animal. Appropriate a dish for the purpose, and always carry something—salt or grain—and feed your horses when you go to catch them.

Every farmer should adopt a few unvarying rules in relation to stock. One of these is, never to kick a poor animal; and another, never kick an animal poorly. Another is, seek to improve poor animals by crossing with good ones. Avoid breeding from blood relations.

1146. **Maxims for All Farmers.**—"Waste not, want not." Waste no minutes, much more hours. Yet you should have hours of recreation. But such hours are not wasted. Never fatigue the body to such a degree that you have no desire to acquire mental food. Work so as to make leisure hours, and devote them to acquiring things useful to the profession of a farmer. Study the habits of insects. Learn which are hurtful and which are not. Learn to use the microscope, and examine plants and insects.

Keep good fences, and you will keep good neighbors. The worst fence is a dog-fence. Gates are more economical than bars.

Every farmer should send his son to a school where he will learn the rudiments, at least, of botany, mineralogy, geology, chemistry, surveying, bookkeeping, besides the ordinary branches of a common school education. Let him also be taught the use of carpenter's tools; and also how to bud, graft, and transplant trees; how to castrate and spay, and how to manage sick animals.

Take agricultural journals; buy agricultural books. What if they are not perfect? What if they publish errors? They also publish much valuable information.

Attend meetings of farmers' clubs and agricultural shows, and take your family with you, and try to learn something about improved stock and improved tools.

Farmers' sons should learn to be good farmers; and farmers' daughters should, both at home and in school, learn to be farmers' wives.

Inculcate economy, as one of the leading virtues of a farmer's life. Economy is not parsimony. Teach your children wisdom, virtue, affection, industry, and they will be truthful, and your home will be attractive.

Never incur debt, except to improve your farm, and only in a way that will be sure to return a profit upon cost. Many a farmer has lost his farm through debts to a merchant; and many others have built themselves out of a home by borrowing money to build a fine house.

Teach your children not to be ashamed of their calling by making it respectable, dignified, and honorable as it is useful. Teach them how to help themselves, and they will not then depend upon others. Remember that the mind of a child is white, and liable to be stained by impurities. Teach them that wisdom maketh men humble, and ignorance and pride the reverse.

Convince your children by your acts, as well as words, of your love, and they will love, honor, and respect you.

Do not contradict things that you do not understand, nor dispute propositions which may prove true.

A snappish dog is often bit. Apply this to yourself.

Trouble comes as the fruit of a first false step.

It is a brave man who does good where he has no expectation of reward.

Provide good tools and a place to keep them. Have a good tool-house, and everything in its proper place. When you lay by tools in winter quarters, have them cleaned, and the bright iron oiled. Use leisure days in winter to repaint and varnish wood-work of tools. Carefulness is economy. Preserving tools saves much expense. Providing them half accomplishes the work, and causes many jobs to be done that would not be if there were no suitable tools at hand.

Dreading a job often consumes more time than doing it.

An impulsive man is better than a drone; for, though he may make mistakes, he will accomplish many useful things—a drone, nothing.

Will is the mother of invention; for will makes the necessity. Men with a will to do always do.

Do not be over-eager nor over-cautious. The first rushes ahead inconsiderately; the last often loses advantages.

If you are wealthy, be benevolent. If you are poor, be more so; for benevolence bringeth blessings, and with blessings cometh wealth. A miser misses many blessings. A sensualist throws many away.

The birds rise early, for then the worms fall an easy prey. Man may learn lessons from birds.

Husking in the field wastes winter fodder. If saved early, husks are worth as much as hay, and more to the farmer than will be paid by the mattress-maker.

Save corn and weigh corn. Learn which sort is heaviest. Weight makes value. The average weight per bushel of ears, of the eight or twelve-rowed sort of Northern flint-corn, is given at 46¼ lbs.; the grain 37¼ lbs., and cobs 9 lbs. A bushel of such corn, 54 lbs.

Paint and preserve should be the farmer's motto. A good coating for rough work is made of fish-oil and water-lime.

Remember that June, in this latitude, is not only, as a general thing, the most busy, most important month of the year—for upon the start given this month to all spring crops depends their success—but it is one of the most healthy and pleasant in all the year. It is the great month of flowers and early fruit; the trees are arrayed in their richest robes of green; the grass is most luxuriant and beautiful; and in the after part of the month we have that most delicious aroma that comes from the hay-field. It is a month of life and hope, and it should be a season of enjoyment; for every farmer, busy as the season requires him to be, should so arrange his work, and so proportion it to the hands employed, that all could have a day now and then for recreation, by relaxation from labor and devotion to innocent amusement appropriate to this lovely month, to invigorate them for the toil of the harvest-field, when it is expected that every member of a farmer's family must put forth extra exertions till that happy time, too much neglected as a holiday, the harvest-home festival. Remember, too, how much that depends upon the sunshine and showers of June. Remember that eggs are abundant in June. If properly preserved, they will be abundant in January.

A barrel of eggs, packed in oats for market, contains sixty to eighty dozen.

1147. **Maxims of Health.**—Constant delving is not wisdom. Men lose elasticity by over-exertion. He that works most hours does not always accomplish most work.

A change of occupation is as necessary for health as change of food. When the weather is hot, the hours of labor should be reduced, or else lighter work substituted during some of the hottest hours. Change from mowing to raking, or from raking to pitching, loading, stacking, enables men to do more work, while they are less fatigued.

Attempt less—accomplish more. Many a man has broken down with fatigue of mind, because he attempted more than he could perform. The mind should be kept as elastic as the body.

Promptness and energy save time. One man always drags his work, and never has leisure. Another, by promptness and energy, pushes everything ahead. Ten hours' hard work, six hours of rest, and leisure for study or recreation, and eight for sleep, will accomplish more in a lifetime than sixteen hours of toil, without rest, and eight of sleep.

Be not ambitious to be the richest, but the healthiest, happiest farmer in your neighborhood, and in possession of the best, not the largest farm. Aim for the most comfortable, not the most showy house.

Great farms—great care. Great income—great outgo. Spend less, and you will not need to earn so much.

A reasoning man uses reason with his teams. A dumb animal can not endure constant fatigue. Attend to the mute appeals of such faithful servants.

Neglect of physiological laws produces premature infirmity. To be long useful to yourself and others, "learn to know thyself."

A short and easy law of health is, to keep the head cool, the body warm, and feet dry. Bathe for cleanliness, but never to chill the overheated body. No man who practices eating or drinking without reason and regard to health can expect it. Be regular in your meals, and never eat inordinately.

Eating in a hurry will hurry you through life. Swallowing without masticating will destroy the strongest digestive organs. Never eat while the mind is agitated nor body exhausted. Digestion requires health of body and mind. Late suppers, early graves.

Tea and coffee in childhood—tobacco in youth—intoxicating liquor in manhood—nothing in old age. There is no old age for those who abuse God's good gifts.

Marry in haste—repent at leisure. An uncongenial companion is worse than none. There is but one thing in conjugal life worse than a jealous wife. The wife can tell what that is.

It is worry, more than work, that kills. Fits of anger bring fits of disease.

Surfeits are the physician's agents. So are all irregularities. Among these include all high-seasoned food; all tempting the appetite with bitters, acids, and spices; all forcing of food into the stomach when nature says, No; all practices that savor of "up till midnight, in bed till noon."

Ice-water promotes health, because a smaller quantity than from well or spring cools the body and quenches the thirst. When very much heated, first cool the hands and face, and hold a lump of ice in the mouth.

The farmer's food should be plain, substantial, hearty. It should be taken with a view to the labor to be undertaken, to the rest required, and to the needs of the body. It should consist more of fresh meat than is usual. Salt fish is a healthful and economical change from salt meat. Eat more fruit and less meat—more plain bread, and less pie and cake—more *soup-maigre*, and less rich gravy. To be healthy, you must eat simple food. Dainties make beggars. Rise early, and you will digest easily.

Live in the light. Health and dark rooms are incompatible, both for man and beast. Light is as necessary as air. A nut-brown face is more beautiful, with health, than a pale one with pain and lassitude. Look at the flowers in a dark room, and learn a lesson.

Mental and moral depression are dead weights in the scale of health. A man's health may be measurably controlled by a strong will. Judgment and discretion are better than doctors and physic. When a physician or nurse says to a patient, "You will not die; you shall recover," it aids all their efforts.

Simples are better than compounds. This is often true in remedies for family diseases. It is true in relation to the common puff-ball. There is no better styptic. Bleeding at the nose has been stopped by a few puffs of this dry fungus. A paper published by the London Medical Society says that the puff-ball is a valuable anesthetic. It is owing to this property that bee-keepers use it to stupefy bees. The effect is precisely the same as that produced by chloroform, if, while burning, the fumes are inhaled.

A valuable disinfectant for fetid sores has been discovered in Paris—a mixture of one to five parts of coal-tar, by trituration, with one hundred parts gypsum, in fine powder. This powder is used dry, or made into an ointment, and its effect is such as to render the discharge of a gangrened sore inoffensive.

The organ needing most care in the human body is the cuticle. Exercise, water, and friction are its best preservatives. The effects of old age are exhibited in the skin earlier than anywhere else. It loses its bloom; it wrinkles; it grows hard, and loses its fine sensibility, and, upon the most exposed parts, becomes dry and horny. It is then more like a sort of armor than soft, velvety skin, and it seems to cut off communication between the body and surrounding atmosphere. The great preventive of this is perfect cleanliness in youth. Plunging into the water is not necessary, but frequent ablutions of the whole body are. For the cure of hard, horny hands there is no better remedy than urine. For health, comfort, and longevity, soap and water are worth more than materia medica to a farmer.

Ice is one of the most valuable remedies for some diseases. For nausea, accompanied with burning in the stomach and thirst, swallow lumps of ice as large as peas, one after another, every five seconds. This has checked severe attacks of diarrhea. Ice in a bag, or wrapped in a towel, upon the head in brain fever, is an invaluable application. Ice bound to the throat, in case of inflammation, is very valuable. Put ice upon the back of the neck to arrest bleeding at the nose. Dyspeptics should not drink ice-water at meals.

Mirth is a medicine. It is not taken half often enough. It restores mind and body. It is one of the causes of elasticity of children. They have not yet learned to restrain their mirth. Many of the great and good men of the world have been mirthful men. We doubt the correctness of all tenets that deny mirthfulness to all human beings. It is their birthright. "God made man a laughing animal." Allow your children to be mirthful, and join them in their sports. It is the cheapest way to save doctors' bills. Care drives nails in the coffin; mirth draws them out.

The cook is the cause of much sickness. "Bad blood" comes of bad food. *Neuralgia*, one of the most common of all maladies in the present age, is caused by the condition of the blood, under the general term *bad*. It gets bad for lack of suitable food, lack of proper exercise, and unwholesome air, all of which produce indigestion, dyspepsia, thin, pale faces, neuralgia, and its train of almost unbearable pains. There is no medical advice that can be given to those subject to neuralgia better than this: Eat to live, not live to eat. Eat suitable food, and in such quantities as digest most easily. Remember, "what is one man's meat is another man's poison." Take much exercise in the air out of the house. Keep the bowels free by using fruit, and such farinaceous food as will not produce constipation. If that occurs, use enemas of tepid water, with a trifle of salt and molasses, instead of pills and purgatives. Keep the whole surface of the body absolutely clean. The skin, kept clean by judicious washings and frictions, helps, by its open pores, to unload the system of its surplus; the bowels, kept free by fruits, berries, coarse bread, and cold water, are another source of deliverance of excess. While these articles of food supply but a moderate amount of nourishment, in addition, active exercise still more rapidly works off the surplusage of the system, and the man is well; not as soon as by bleeding, but by a process more effective, more certain, more enduring, without harm or danger. There is no form of mere neuralgia which is not safely and permanently cured, in a reasonable time, by strict personal cleanliness, by cooling, loosening food, as named, and by breathing a pure air in resting in our chamber at night, and in moderate labor out of doors during the hours of daylight. Those who prefer uncertain physic or stimulants to these more natural remedies are unwise, and ought to have neuralgia—a little. Chloric ether, which is made by mixing one part of chloroform with six parts of rectified alcoholic spirits, is excellent for outward application in neuralgia and toothache; but the best external application for neuralgic pains, and also for rheumatism, is made of the following compound, and is a real "pain-killer:" Oil rosemary; oil cloves; oil origanum; oil turpentine; spirits ammonia; tincture cantharides; high-proof alcohol; one ounce of each, specific measure. Mix, and apply with the hand, rubbing freely. Shake the bottle before using. The following is recommended as an internal remedy: Half a drachm of sal ammonia in an ounce of camphor-water, in doses of a teaspoonful every five minutes. Diptheria, another dangerous disease, has often been cured by the following treatment: Make two small bags, that will reach from ear to ear, and fill them with hard-wood ashes and salt; dip them in hot water, and wring them out so they will not drip, and apply them to the throat; cover up the whole with a flannel cloth, and change them as often as they become cool, until the throat becomes irritated, near blistering. Then take a piece of flannel, well covered with a stiff lather of castile soap, dip in hot water, and apply to the throat as hot as it can be borne; have another ready when this becomes cool, changing frequently. At the same time, use a gargle made of one teaspoonful of cayenne pepper, one of salt, one of molasses, in a teacupful of hot water, and when cool add one fourth as much cider vinegar. To be taken every fifteen minutes, until the patient requires sleep. A gargle of castile soap may be used part of the time.

1148. **Maxims for Farmers' Wives.**—Happiness and health are handmaids. Whatever tends to promote one promotes the other. The art of love is the art of good housewifery. Tidiness wins, negligence loses husbands. Home is made happy by woman's constant care. Smiles and neatness are sauce for homely meals. An orderly house with poverty, is better than confusion with wealth. A fretful woman is every man's horror. A woe-begone look has given many a heart-ache. A happy house always wears a cheerful look. To take a social meal in such a house needs no second invitation. A husband is blind to a wife's faults who always strives to please. Do not give vinegar to your husband's friends. Honey is sweet, and its taste lies long upon the tongue. Policy sometimes requires sacrifice. A friend may seem an ill-bird to-day, who, in after-years, will think it no hardship to lend you his wings. With those, you or your children may soar out of despondency.

Children and responsibility are born together. Gentleness and firmness should be born at the same time. Laugh at young cunning, and you may cry at older impudence. Teach your servants always to say "young lady," and you will teach young lady to call her mother "old woman."

Teach your children to obey a look, and they will look to obey. If they obey and respect parents, they will respect all superiors and be loved by all equals. Never command but to be obeyed. To speak to others of a child's foibles in its presence will harden its mind to the faults you deprecate.

Teach yourself what yourself should know in relation to your own children or those under your care.

Children of civilization should not be clad like those in savage life. It is a cruel fashion that exposes their naked limbs to all the vicissitudes of our ever-changing climate. Where such pride dwells, death finds victims. Do not say Providence called the child away, when it dies from neglect of the mother. Furs upon the shoulders, and nothing upon the limbs, is not the dress to preserve health.

Make your children sensible of a mother's love, and they will love you. Teach them to love home. Let them learn, and often sing, this little song:

"Although our home's a lowly cot,
It is the one that God provides—
Where first I heard my mother's voice;
It is a home I love so well,
Because 'tis there that love abides.

Where, day by day, with tearful care,
In gratitude for home and love,
She taught me how to lisp a prayer,
And tune to truth my infant tongue,
And lift my heart to God above."

Never fear spoiling children by making them too happy. Happiness is the atmosphere in which all good affections grow—the wholesome warmth necessary to make the heart-blood circulate healthy and freely. Unhappiness is the chilling pressure which produces here an inflammation, there an excrescence, and, worst of all, "the mind's green and yellow sickness, ill-temper."

Anger and reproof should never go in the same boat. One upsets the other. A loud voice and correction are incompatible. She who governs well has a still, soft voice. Inspire love, not dread—respect, not fear. Seed-plants to-day may produce fruit in eternity.

Cordial and quiet—paregoric and policy—have bred many a depraved appetite. Cakes and candy for present quiet—doctors' bills and other ills in after-years. Time cures more sick children than mercury and tartar emetic.

Order in after-years is the fruit of seed sown in childhood. Teach them to put things in place, and do not make them helpless by always helping them. Teach them to be useful.

Little griefs are often large to little children. Do not forget you were once a child. It is better to bear anger patiently than to excite more anger than a little heart can bear.

The beauty of sunset, children often admire. Teach them that there is another period of day still more beautiful. It is sunrise. It is a scene that never tires. If seen all through a long life, from the same window, over the same tree-tops, it presents a new view, a different combination of colors, and new joys every time it is seen. It is a truth to be remembered, that looking at sunrise every day is not tiresome nor unprofitable; it prolongs life.

Soft words and soft water should be in every household. One turneth away wrath; the want of the other often produces it.

Philosophy and fire-making are intimately connected, though seldom taught together. Every child should be taught how to kindle the kitchen fire. It is an art which many an adult does not understand. The kindlings, or live coals, should be so placed that the current of air should pass directly through the fire into the wood to be ignited. Kindlings and comfort go together. Teach children and servants to save all suitable substances for kindlings, and have a stock in hand over-night. Stalks of coarse plants, such as sunflower, hollyhock, broom-corn, large weeds, and dry twigs, where shavings are not convenient, should be stored for kindlings. Corn-cobs are worth more for fuel than for any other purpose.

Live and learn, and learn every day we live, should be a law of every household.

"The poor traveler, seated to rest upon a bank of snow, dined upon a crust and an onion." Why? This you may learn. Although offensive to many, the onion is a valuable article of food. It is nutritive and stimulant. It satisfies hunger and warms the body.

"Cheese fought with famine, and conquered." This is also something to learn, that hunger is satisfied and strength sustained upon a small quantity of bread and cheese, better than with the same bulk of almost any other food. Therefore, never fear that your husband or child will suffer for a lost meal, if your forethought has put a little bread and cheese in his pocket.

You may learn that the common dandelion (*Leontodon taraxacum*) is used as a salad plant in France, and in Germany its roots are dried, and used instead of coffee; and the value of the plant for medicinal purposes is widely known.

"A simple herb cured sore disease." This proverb should induce all housewives to preserve herbs for winter. Cut them while in flower, and dry in the shade.

Botany and beauty are twins. Teach the first to your children, and they will acquire the second; if not in face, in mind. Show them how to preserve specimens. Plants to be dried, to preserve their form and color as far as possible, in stalk and flower, should be laid between folds of old newspaper, and pressed. The paper absorbs the moisture of the green plants, and becomes quite damp in a few hours. Then open the pile, and place each paper, with the plant within its folds, on shelves or over the floor, for two or three hours, longer or shorter, according to the dryness of the weather, until the papers are dry, but not until the plants curl up. Then place them under the stone again for a day, and repeat the drying process. Increase the weight as they approach thorough dryness. Only one plant (unless quite small) should be placed between the folds of a single paper. When perfectly dry, take them out, and several may be placed in a fold, for keeping or sending to a distance. Mark the time they flower on a slip of paper attached to each, whether growing in wet or dry ground, on rocks or in swamps, woods or open ground, wild or cultivated.

Flowers should be cultivated by every mother, and she should make it a rule of her life to teach the love of flowers to her children. Show them that the world is full of flowers—in the woods, on the wild prairies of the West, "waving like a sea of flowers"—in the meadow—on the old hills of the pasture—creeping along the stone wall—climbing the rocks—living on trees, are the wild flowers, abounding everywhere—everywhere sending forth their fragrance free as the morning air. Bottled odors are not sold by Nature—they are free. In civilized countries, wherever a high degree of cultivated taste prevails, flowers are planted in gardens, parterres, front yards, and back yards, all around the house, to gladden the eye and please the olfactory nerves. Then, again, what thousands of dollars are expended upon hot-house conservatories, forcing Nature to produce flowers out of place and out of season, that we may be gratified with their sight at all times of the year—on our mantlepiece, in our window, everywhere, in-doors or out, wherever we can find a spot to set a little pot, with its little stem and single bud. But that bud will bring a flower—that flower will bring a smile, a joy, a holy, happy feeling, and perhaps a prayer of thanksgiving to Him who opened that bud and spread its beauty and fragrance abroad, for the great, good, glorious gift of flowers.

Right across the street from where we write this paragraph there is a whole row of flower-pots in a window—seven of them—we know the number well, for we have counted them over and over many a time; and they are tended by a fair hand, guided—we have no doubt of that—by a good heart, who snatches a moment from her daily toil—she is a bookbinder's girl—to tend her favorite flowers. Well, we only hope they gladden her heart as much as they please our eyes. They are blooming now, right opposite our window. We have often watched a delicate hand as it comes out to pour a little water into the pots or take one of them into the room to set on her table where she works; but we have never seen her face; that remained concealed behind the painted, opaque glass; yet we fancy how it looks—that it is sweet, like her flowers.

1149. **Maxims for Farmers' Girls.**—The art of being loved should be the first thought of a girl approaching womanhood; for with that will come all the arts of housewifery. No young woman need to expect to win and keep the love of a man worth loving, without exercising this art. The secret of this art is all embodied in the "small, sweet courtesies of life."

The art of preserving includes more than pickles and peaches. A husband's love must be preserved as well as won.

To preserve beauty, you must preserve health. That is preserved by moderate labor, cheerfully performed; by generous diet, quiet sleep, and proper dress.

Health is woman's richest jewel. Its casket is the heart. Its location is within a chest that should never be rudely exposed to injury. Keep that well covered, though all the limbs should be exposed. You need never fear cold if properly clothed. See that sitting-room and sleeping-rooms are well ventilated. Do not neglect exercise nor recreation.

"Laugh and grow fat." It is an old proverb, and a true one. Boisterousness is not mirth. The meaning of the maxim is, Always be cheerful, and thankful for health, and more health will follow.

Hugging the stove will never gain health. That comes from air and exercise. A flower fades in a hot-air room. Beauty does the same. Health, contentment, happiness, and matrimony should dwell together. When you are reasonably sure that they will in your case, you may contract marriage. Love may bring care; the want of it may bring sorrow. No one has a right to ask to be exempt from a share of the cares of life; but, before you make this contract to leave your mother, be sure that you have learned every household duty that she can teach. One of the most important things for you to learn about household duties is, not to depend upon borrowing. There is nothing that will render you unwelcome to a new neighborhood quicker than this. However kindly disposed and pleasant your neighbors may be, they will soon grow cold if they find that you are an habitual borrower—sending for a little tea or sugar to-day, a little soap or salt to-morrow, and bread or butter next day. In sickness, you may send to a neighbor for medicine and assistance, and they will be freely given. In health, avoid borrowing as you would a pestilence.

Indolence is the parent of languor. That, as a general thing, is true, although there are cases where languor comes of ill health or fatigue. But, unhappily, listlessness is a state that city ladies, and sometimes farmers' girls, fall into. To prevent this, exercise freely in the open air. Do not be afraid of walking. It is one of the most healthy kinds of exercise that girls can take. Wear strong shoes, and take long walks.

You will never die on horseback. This is an old and very true proverb. We can not give better advice to farmers' girls than this: learn how to ride well, and ride much. Walking, sometimes, is fatiguing, while a canter, upon an easy-going horse, invigorates body and mind. Many a poor, diseased liver has been restored to health on horseback. Roses will bloom upon pale cheeks, rushing through the air before sunrise.

A New Hampshire farmer was congratulated upon the healthy appearance of his girls, and asked to explain the cause. He said, "It is because their diet has always been wholesome, plain, and simple, yet abundant. They drink water or milk, never having used tea or coffee. They have exercised every day in the open air, assisting me in tending my fruit trees, and in such other occupations as are appropriate for women; and their dress has never been such as to hinder free respiration of our pure mountain air, which is a better panacea than druggists' remedies."

A burnt child dreads the fire. This is another old and true proverb. A better one would be one that taught the child to dread a dress that would burn. Many a life might have been saved by rendering a gauzy dress incombustible. This can be done by dipping it in water in which crystallized sulphate of ammonia has been dissolved, to the extent of about seven per cent. of its weight. Alum, in pretty strong solution, and also phosphate of soda, or borax, are said to produce the same result; that is, to render all light fabrics that are dipped in the solution so incombustible that they may sweep over the blaze of a lamp or fire without igniting. If you love life, remember this.

1150. **Maxims for Farmers' Boys.**—To be useful, be industrious. To be respected, be willing to do your duty in all situations. To be loved, love others. To be rich, be frugal. Save pence, and shillings will follow. Learn that a stick that will not make a rail may answer well for a stake. If you can not make a pot of a small board, you can make a pot lid. Everything is worth saving, and everything is useful for something. Perseverance built a house. All difficulties are overcome by diligence and assiduity. Your business will be attended to if you attend to it yourself. If you trust to your neighbor to watch your pot, the fat will be in the fire. Do not try to catch mice with mittens on until you see the cat do it. If you would save toll, you must do your own grinding. If you would grow corn to grind, you must first plant it. If you would have it grow while you sleep, you must not plow with a pig for a team. Do not look for wealth without labor. Do not look for courtesy from those who never see it in you. Good manners save money. Good conduct, and not good looks, wins friends. If you wait for the shoes of a dead man, you will go long barefooted. If you race for a shadow, be sure to start before sunrise. Never despair; that is distrusting God. Be observing, and you will learn much that will be useful in after-years. Constantly study into the nature of things of every-day use. Nothing is of "no importance," or unworthy of your attention. Seek all the means in your power for mental improvement if you wish to be respected. But few persons ever reflect on the means by which they may improve their general ability for increased thought, while all agree that the human mind is susceptible of such improvement; by no class of citizens is this subject more neglected than by farmers. The farmer, beyond all others, should have clear powers of observation, so as readily to observe and apply nature's laws. His vocation is the root of all prosperity, and until the farmers of a nation are progressed to the highest power of observation, the country can not rise to the highest rank. By observation alone you may learn much. You may learn what you will find that many old farmers do not know. Among these, that cows and sheep have no upper teeth: that cold water will dissolve more salt or lime than hot water; that a gallon of water will dissolve more plaster of Paris than it will of slaked lime which has been long enough exposed to the atmosphere to become carbonate of lime. How many know that water is at its mean of size when at 40° of heat—that if cooled below that temperature it swells, until it becomes ice at 32°, and if heated above 40° it also swells, until it eventually becomes steam, thus occupying more than 1,700 times its original space? Still, all these are facts, and to minds generally observant, they are well known to be true.

By observation you may learn why rain or pond water is better for plants than well or pure spring water—that it is because it contains more carbonic acid. Do not say you have no opportunity to learn facts that are only recorded in books. Let any farmer's boy devote the evenings of a single winter to the reading of geology, entomology, chemistry, natural philosophy, and natural history, and apply his acquired knowledge as an amusement, while pursuing his vocation during the following summer, and he will find himself able to observe and comprehend thousands of incidents connected with natural law which before would have passed by unobserved. He will then see and understand that the soil is but a *débris* of the rocks; that in its original formation this occurred from the combined influence of sun and air, and changes of temperature by freezing and thawing, in rendering these rocks a soil. He will see how the convulsions of nature have mixed the soils of different localities; he will see, also, that the earliest vegetable growths were necessarily grosser sorts than those now produced; and that they, by receiving carbon from the atmosphere—for the carbon originally must have existed there in immense quantities in the form of carbonic acid—by their decay deposited it in the soil, thus improving its quality and rendering it fit for the development of a more advanced class of vegetation. He will also see where and from what causes animal life progressed, and can trace its progress. He will clearly understand that such vegetable matters as were consumed by animals merely change the arrangement of their particles by such process, and that no one particle was put out of existence, but that by the decay of these animals and the change of the arrangement of the ultimate particles, both of themselves and their food, that they re-enter nature's great storehouse—the atmosphere and the soil—in a progressed condition; that thus both plants and animals have progressed to their present state.

He will next be able to observe why deeply disintegrated soils can never suffer from drouth, because he will know that when water is absent from the soil it is present in the atmosphere, and will be deposited on the surface of colder particles, at greater depths than can be reached by atmosphere when attempting to percolate shallow plowed land. He can trace the action of this moisture and its office in the soil; he can know what amendments are required to replace those which he may find to be deficient; and, indeed, he can render himself doubly happy and a better servant of his Creator, and his vocation ameliorating to his fellow-men. All this must occur if he knows so much of nature's laws as will give his mind the first ability for closer observance, and his progression as an individual will be the natural consequence of its exercise. And this does not call for the tedious exertions of thought as practiced by the mathematician and the merchant, but merely for the culture of the power of observation to see truths as they exist, and apply them rightly; and this, and nothing else, he will find to constitute the science of agriculture.

Remember that plowing deep is the easiest way to enrich your farm. A farmer who was unable to own or hire a strong team, adopted the plan of running the same plow twice in one place, and is sure that the extra work was much more than paid for by an increase of crops. By this plan he plowed a stiff sward 12 or 14 inches deep, and got a good tilth on top of the reverted sod which had remained undisturbed through several years of previous cultivation, and crops were more free from the effects of drouth than ever before.

Boys should not neglect their country school, notwithstanding their fathers allow it to remain the most neglected building of all that are called public ones, and frequently most uncomfortable and uninviting to cultivated minds, and hence those of the least cultivation are employed as teachers. And what is learned there? Just what the books teach—nothing more. The child learns A, B, C. The larger one finds the letters transposed, and spells cab. The next advance is to learn the mechanical operation of forming a resemblance to these letters with pen or pencil. Then the child reads that one class of words are called nouns, another verbs, and a third adjectives. And so on and on through books and daily tiresome lessons, the child plods up to maturity, and if particularly bright may be called "well educated." Yet what of the surroundings of every-day life has that child ever learned in school? Now, let a farmer go into the district school and ask of teacher and pupils these few simple questions—questions that involve things that might be learned in school, but are they? The answers to his questions will show him whether they are or not:

What kinds of forest-trees grow indigenously in this neighborhood?

Can you give their names, common and botanical?

Which are the most useful, and what are their uses?

What useful and what noxious plants are most common?

What plants are cultivated, and what for?

How many of these are indigenous; where are those from that are not?

What is the staple product of the neighborhood?

What is the nature of the soil? Name its principal constituents.

What kind of rocks abound here, and are they in place; and if not, where did they come from?

How many kinds of birds abound in the neighborhood, and are they useful or injurious? Give their common and scientific names.

Do the same of quadrupeds, reptiles, and insects.

These are some of the things that might be learned in school, but rarely are. The subject is one worth a thought, and might be a good deal amplified and thought of, and not alone by farmers' boys. The farmer himself may well think of these facts.

Every country school should have as one of its standard books a "Manual of Agriculture," an excellent new work just published under the sanction of the State Board of Agriculture of Massachusetts, edited by George B. Emerson and Charles L. Flint; for it is full of practical information for the school, the farm, and the fireside. It contains many things desirable for all farmers' children to learn in school, and is admirably arranged for that purpose.

"The Hand Book of Household Science" is another valuable school-book which should be in extensive use. Both of the books named are of convenient size for schools, and both contain many things of great value not only to pupils, but their teachers, who might learn many things that should be taught and learned in all schools.

Among other things that boys and girls should learn at school are the names of the days, or, rather, why they are so called. They are all derived from the old deities of the Saxons, each one of whom has a statue intended to personify the idea of the being. For instance, the idol of the sun, which gives name to Sunday, is represented with his face like the sun, holding a burning wheel, with both hands on his breast, signifying his course round the world. The idol of the moon, from which comes Monday, is habited in a short coat like a man, but holding the moon in his hands. Tuisco presided over strife, litigation, combats; so Tuesday, which derives its name from Tuisco, was originally set apart for the commencement of combats, assizes, and litigations. His statue is clothed in skin garments, such as were worn by the old Scandinavians. Odin or Wodin, from which the name of Wednesday is derived, was a valiant and much-loved Saxon prince, whose name was revered as "universal father," and whose image was invoked in prayers for victory in battle. Thor—god of thunder—was the son of Odin, and gives name to Thursday. His image is represented in a bed, holding a scepter in his hand, with twelve stars over his head. Friga, from whence we have Friday, was the wife of Odin, the goddess of hope, peace, fertility, and riches, though represented with a drawn sword in the right hand and a bow in the left. Saturday is said by some authorities to be derived from Saturn, and by others from the Saxon deity Sætor. His image has a wretched appearance, with thin visage, long hair and beard, with a pail of water and fruits and flowers in his right hand.

The names of the months come from the Romans.

The first was so called from Janus, an ancient king of Italy, who was deified after his death, and derived from the Latin word *Januarius*.

February is derived from the Latin word *Februo*, to purify, hence *Februarius;* in this month the ancient Romans offered up expiatory sacrifices for the purifying of the people.

March was anciently the first month. The name is derived from the word Mars, the god of war.

April is so called from the Latin *Aprilus*, *i. e.*, opening—because in this month the vegetable world opens and buds forth.

May is derived from the Latin word *Majores*, so called by Romulus in respect toward the Senators; hence Maius or May.

June, from the Latin word *Junius*, or the youngest of people.

July is derived from the Latin word *Julius*, and so named in honor of Julius Cæsar.

August was called in honor of Augustus by a decree of the Roman senate.

September, from the Latin word *Septem*, or seven, being the seventh from March.

October, from the Latin word *Octo*, the eighth.

November, from the Latin word *Novem*, nine.

December comes from the Latin *Decem*, ten, numbered so from the Roman first month, March.

Boys should learn the nature of minerals; that salt is one as much as marble, and like it is quarried from deep mines. "Liverpool salt" is rock salt refined. In its mineral state it is not white, but has a pinkish hue.

Until refined it is not good for the dairy; that is true, however, of all manufactured salt. In Cracow, Poland, there are great salt mines, wonderful as a curious work of human industry.

Boys, do you know the size of a square acre? You can only learn to estimate the area of a field by comparing its size with a well-known plot, Select a level spot, clear of trees and fences, and measure a square 208 feet 9 inches upon each side, and set up stakes at the corners, and exactly half way between. That gives you the size of an acre and quarter acre. A half acre is $147\frac{1}{2}$ feet square; fourth of an acre, $104\frac{1}{4}$ feet square; an eighth of an acre, $73\frac{3}{4}$ feet square.

1151. **Things to be Thought About.**—There are a great many useful little things which need to be stored up for farmers' use. For instance: What is the difference between the gross and net weight of a hog? We have told you, in No. 17, that in dressing, hogs lose one fifth. That is the general rule; but it varies with quality and condition. Some smooth, small-boned, well-fatted hogs lose only 13 or 14 per cent. Some calculate shrinkage at 20 per cent. on the first cwt., 17 per cent. on the second, and 12 per cent. upon all above that. One calculation, for a hog of 260 lbs., live weight, is 7 lbs. of blood, 32 lbs. offal, leaving 220 lbs. net weight. If a hog of 275 lbs. net weight is cut up, the several parts will weigh as follows: Head, 24 lbs.; shoulders, 29 lbs.; hams, 42 lbs.; sides, 90 lbs.; lard, 17 lbs.; lean meat, scraps, and bones, 73 lbs.—275. The proportion is thus seen to be, head, nearly one eleventh; hams and shoulders, a little over one fourth; sides, or clear pork, nearly one third; bones, etc., over one fourth. The hog, at 6 cents a pound, would amount to \$16 50, and make the value of the several parts as follows: head, at 3 cents, 72 cents; shoulders, at 6 cents, \$1 74; hams, at 7 cents, \$2 94; sides, at 9 cents, \$8 10; lard, at 9 cents, \$1 53; lean meat, etc., at 2 cents, \$1 46—\$16 49.

There are a few simple rules in the philosophy of fertilization that farmers should think of, talk about, experiment upon, and act accordingly. One is, that all non-volatile substances, such as lime, plaster, salt, bone-dust, nitrates and phosphate, should always be applied upon the surface, because their natural tendency is to descend by the laws of gravity. Volatile manures only require to be covered to prevent evaporation. Lime sinks lower than roots. Lime, ashes, or clay are, each or all, beneficial to sandy soil. Clay to sand is better than sand to clay. Limestone land retains heat, and is therefore best for crops that require continued warmth during a short season.

"There was frost upon the bottom lands, but none on the hills" Why? This is a subject for thought, and, as it is a natural effect, it should govern the planting of tender crops. The reason is, that the bottom land is usually of darker color than hill land, and it is generally supposed that it radiates heat more rapidly than lighter-colored soil.

Dry peat, or muck, will absorb four times its own weight of water.

It requires four pounds of clover to make one pound of mold; and a tun of dry forest leaves will make 500 lbs. of mold; and that mold will produce a tun of forage plants.

Phosphorus is found in all plants, and is a necessity of the growth of many of those most useful to man. Commercially, phosphorus is valued at four or five thousand dollars a tun. Of course, it can not be used in that form for agriculture. It can in the cheap form of phosphate of lime.

Soft water is preferred by most animals. A beast will often show a preference to a pond of foul water that is soft, rather than to a cool spring that is hard. Some stable-men, who have none but hard water, always keep it exposed to the air, in a tub or trough, some time before it is used.

A kettle is not a necessity in heating water. It may be heated nearly boiling hot in any wooden vessel, by hot stones, or a lump of cast iron. This plan is very useful in scalding hogs. An iron weight of twenty-five pounds, with a ring for handling, is a good form, and with it a given quantity of water can be heated quicker than with an open kettle.

A machine belt of leather should never be put on with the flesh side to the pulley, because it will wear longer the other way.

What is the strength of a man? Or what is it compared with a horse? Farmer, do you know? Have you ever thought of it? It is very important for you to know how much labor you can perform, or how much you have a right to expect of hirelings. The result of many experiments by scientific men is that, on the average, an active, healthy man, of about 150 lbs. weight, can walk 264 feet per minute, working ten hours daily, and make 30 miles a day, upon level roads. If he mounts stairs, he walks only one tenth as fast, and is unable to continue the labor more than eight hours a day. If he carries 90 lbs. upon his back, he can move only 132 feet a minute, or one and a half miles an hour, and continue seven hours a day. If he climbs a stair with 150 lbs. on his back, at the rate of seven feet per minute, he can work only six hours a day. If a man works with a wheel-barrow, carrying loads a distance, and returning empty for a new load, he may carry 130 lbs., at the rate of 90 feet a minute, ten hours daily. The absolute force of traction which a man can continue ten hours a day, by a rope passing over his shoulder, at the rate of two miles an hour, is given at 75 to 132 lbs. The greatest velocity at which a man can walk varies from $4\frac{1}{2}$ to $6\frac{3}{4}$ miles per hour. The proportion of strength exerted by a man at different employments is as follows: Working a pump, 100; working a winch, 167; ringing a bell, 228; rowing a boat, 248. This shows the importance of arranging all machinery to be operated by manual labor so that the operator can exert his strength to the greatest advantage. If a pump was rigged so it could be worked exactly upon the same principle as the row-boat, the man would be worth nearly two and a half times as much as at the handle of one in the ordinary way.

The average strength of men varies in different countries. In England it is given at 71.4; France, 69.2; Van Dieman's Land, 51.8; New Holland, 50.6. Strength and activity must not be confounded; nor activity and weight. If two men of equal strength and weight contend, one may pull the other off his feet. Let one take a third man under his arm, of equal weight to himself, which would appear to be a sufficient load, yet he will not only carry it, but pull his antagonist easily after him across the room.

The strength of a horse is variously estimated as compared with man. That is, one horse is estimated as equal to from five to fourteen men. In the estimates of the power of a horse, compared with the power of a steam-engine, Watt fixes the horse-power at his ability to raise 33,000 lbs. per minute, the weight being attached to a rope over a pulley. An engine that can do the same is rated as one-horse power. Its real power is greater, because the engine has the greatest power of endurance.

Men and animals acquire, by practice, great powers of muscle and endurance. A brawny London porter walks three miles an hour, with two or three hundred pounds upon his shoulders. Doctor Windship, of Roxbury, Mass., lifts a tun attached to a strap across his shoulders, and he is not a brawny man. A horse will endure more labor, though necessarily working harder, traveling in a hilly country than upon a plain. The power of a horse harnessed in a wagon is calculated at 770 lbs., drawn at the rate of 433 feet per minute, $4\frac{1}{2}$ hours per day, day after day, without exhausting his power. This is about 22[1] miles per day.

For carrying loads on a plane, a man is rated 1; a horse, 4.8 to 6.1. For transportation in wheel-carriages, a man is rated 1; a horse, in four-wheel carriage, 17.5; in two-wheel cart, 24.3. A mule, with cart, 23.3; an ox, with cart, 12.2.

Another authority gives the following as the units of man and horse power: An active man, in the prime of life, can raise 100 lbs. one foot per second, working ten hours per day; a horse can raise 550 lbs. in the same space of time.

These "things to be thought about" should be thought of more than they are by all farmers. So should "What food will produce the most strength?" Race-horse men say that broken grains of hulled Indian corn, with corn-leaves, are the best food. Workers of horses think that they will do the most work, where action of muscle is required, if fed on oats. It is also said that five pounds of corn will make a pound of beef; and that three and a half pounds of corn-meal will make a pound of pork. Yet who knows? We know that all should inquire.

1152. **How to Dress Fur-Skins, or Sheep-Skins with the Wool on.**—Take equal parts of salt and alum, pulverized, and sift about four ounces upon the flesh side of the skin, while fresh from the body—or, if dry, after being moistened—and then fold it up carefully, and keep it in a damp place about four days; then open it, and lay it on a table, and scrape it with a dull knife, to get all the adhering flesh off, and then rub it with a blunt wooden instrument, until it is dry and soft. Then thoroughly wash it in warm soap-suds, let it dry moderately, and just before it is fully dry, rub it soft with your hands. After rubbing, it is soft and pliable as a kid glove, and will continue so. Another plan is, to nail the skin tightly and smoothly against a door, keeping the flesh side out. Next proceed, with a broad-bladed, blunt knife, to scrape away all loose pieces of flesh and fat; then rub in as much chalk as possible, and be not sparing of labor; when the chalk begins to powder and fall off, take the skin down, fill it with finely-ground alum, wrap it closely together, and keep it in a dry place for two or three days; at the end of that time unfold it, shake out the alum, and the work is over.

1153. **How to Dress Skins Soft, like Buckskin.**—Take the skin fresh from the animal, and stretch it tightly upon a board, and scrape off all the flesh that will come off easily. Then warm two quarts of milk, and mix in a tea-cupful of salt and half an ounce of oil of vitriol. In this mixture soak the skin about forty minutes, stirring it and keeping it warm. Then take it out, and stretch and rub it over the smooth edge of a board, working it till dry. The Indians dress all their deer-skins by soaking them in a paste made of brains, and, after rubbing them, drying them in smoke.

1154. **How to Prepare Fur-Skins for Market.**—In the first place, carefully avoid getting blood or dirt upon the fur before skinning. If that is unavoidable, carefully clean and dry it before you take off the pelt, which, of all small animals, such as mink, fox, weasel, cats—wild or tame, muskrat, fisher, otter, rabbits, squirrels, should be taken off without ripping down the belly, and no bones should be left in legs or tail, and no flesh left adhering to the pelt. This must be carefully scraped or picked off, before or after the pelt is stretched, which is best done upon a thin, smooth board or shingle, cut a little tapering, upon which the skin should be turned inside out as soon as it is stripped from the body, and drawn smooth and tight, and tacked fast, and then hung up to dry in the air or in the smoke, with but little heat from the fire. If you are in the woods, or where you can not get boards or shingles to make your stretchers, you must adopt the Indian's mode, and stretch your pelts upon a bow made of a hickory sprout, or other tough wood, which, after trimming perfectly smooth, you will slightly notch in the middle of the length, and bend toward the notch. Then, half way from the nose end, cut two notches and insert a brace, which will be held in place by tying a string around the ends, so as to bring them just near enough together to suit the size of your pelt. It is sometimes necessary to put in two or more braces, to hold the sides of the bow firm, and wide enough apart to stretch the skin into a good shape and to the utmost tension, which adds to its value. It is not necessary to stretch skins fur side out to show the quality. A good judge can tell a good pelt as soon as he sees the flesh side. Well-handled skins will always sell for 10 to 25 per cent., and sometimes 50 per cent., more than similar skins badly handled. What we mean by the technical term "well-handled" is, the preparation of the skin, which is a very simple matter *to those who know how*. If you wish to dress the skins for home use, follow the directions of 1153. using less materials and more labor, in proportion to size of pelts.

1155. **Farmers Should Use Rawhide.**—A skin of an animal, whether cow, calf, colt, or horse, that dies on the farm, is worth more at home than at the tanner's. Cut them into narrow strips, and shave off the hair with a sharp knife, before the kitchen fire or in your work-shop, stormy days and evenings. You may make them soft by rubbing. A rawhide halter-strap an inch wide will hold a horse stronger and last longer than an inch rope. It is stronger than hoop-iron, and more durable, and may be used to hoop dry casks and boxes, and for hinges. Try it upon a broken thill, or any other wood-work that is splintered. Put it on wet, and nail fast. Thin skins make the best bag-strings in the world. A rawhide rope is a good substitute for a chain. It is valuable to mend a broken link in a trace-chain. For some purposes it is best to use it in its natural state. For other purposes it may be dressed soft.

1156. **Oiling Harness and Boots.**—Oils should not be applied to dry leather, as they would invariably injure it. If you wish to oil a harness, wet it overnight, cover it with a blanket, and in the morning it will be dry and supple; then apply neat's foot oil in small quantities, and with so much elbow-grease as will insure its penetrating throughout the leather. A soft, pliant harness is easy to handle, and lasts longer than a neglected one. One authority says: "Never use vegetable oils on leather; and among animal oils, neat's-foot is the best." Another says: "The very best oil for all applications to leather is the common castor-oil. One of the reasons of its value is, that it has less tendency to harden or thicken the leather, as neat's-foot and other animal oils do. Leather that has been frequently saturated with any kind of animal fat and exposed to water, as boots and harness are, instead of remaining pliable, becomes hard and dry, losing its elasticity, and finally becoming brittle and worthless; but that which is oiled with the extract of the Palma Christi bean, and in a less degree with flax-seed oil, appears to retain its fibrous toughness a great deal longer. The oil is naturally viscid, and, containing some glutinous matter, serves a better purpose than animal oil to exclude water, which, when absorbed by the leather, is the real cause of its inelasticity. Castor-oil, if bought by the gallon, is not expensive. It was manufactured a few years ago in Illinois, and sold at fifty cents a gallon; and the beans were grown as a field crop, at fifty cents a bushel. It is well worth while for farmers to give castor-oil a trial as a lubricator of leather."

1157. **Lubricating Axles.**—Take three pounds of tallow, one of lard, and one of fine black lead, and two ounces of India-rubber, cut in shreds; beat them together until they are completely mixed, when it makes a most excellent anti-friction grease for the axles of wagons. And when you can not get these materials, make a paste of wheat flour in oil, and it will answer nearly as well. Powdered soap-stone and oil are excellent.

1158. **Protection for Horses and Drivers.**—At the South they have "buggy umbrellas." They are made just like the common umbrella, with a staff four or five feet high. In the bottom of the wagon is a socket, which holds the end of the staff when in use. At other times it is laid down, or carried into the house, like any other umbrella. Every carman might have just such a one, without interfering at all with his load. Every stage-driver should have one, to protect him both from sun and rain. They are real life-preservers, health-promoters, and preventives of excessive drinking. Everybody who rides in open wagons, in city or country, should have a wagon-umbrella. It is much better than a top-wagon, because lighter. It would also be good economy for every farmer to have a water-proof covering for each wagon-horse, to protect him from sudden showers when heated, and at all times from cold, drenching rains.

1159. **How to Fix Chain Pumps.**—Chain pumps frequently get out of order, in consequence of too great length of chain. If a chain should be of the correct length when it is new, after it has been in use for a year or more, the reel, the links, and the roller in the bottom of the well become worn, so that the chain will be several inches too long, and in consequence of which the chain will often become entangled at the bottom of the well, and will stop the motion of the pump very often and very suddenly. In such a case, open links of the chain, and take out enough to make the chain as tight as it was originally, and the pump will work as well as ever.

1160. **How to Mend an Aqueduct Pipe.**—How to solder a lead pipe with a head of water on is a secret worth knowing. We have known instances where the knowledge imparted in this item would be worth much more than the cost of this volume. Repairing pipes, whether lead or other material, under a pressure of fifty feet of water, that can not be shut off, is a serious undertaking; but see how easy! A lead pipe was accidentally cut apart by a spade. No one knew how the water could be shut off without going a long distance, and then it would stop the supply of many persons connected with the same line of pipes. An ingenious plumber was sent for. He first stopped the flow by a wooden plug. Then he called for broken ice and salt. "He is going to freeze ice-cream," said a little boy, who knew the philosophy of that operation. No, he is going to place the ice and salt around the pipe, and freeze the water solid. It was done in a few minutes. In the mean time he had added a short piece of pipe to the empty part, and as soon as the ice-plug was perfect, he withdrew the wooden one, and in one minute had made a soldered joint. In five minutes more the ice-plug melted, and on to its destination flowed the living current.

1161. **Do Fogs in January Indicate Frosts in May?**—Such is the popular belief with many people. To show that it is not well founded, we give the statement of a writer in the *Country Gentleman*, who says: "On looking over a record for the past seventeen years, I can not find anything on which to base such an assertion. It is true, as a *general* thing, we have fogs in January, and also true, as a *general* thing, we have frosts in May; but we have had many a January with neither fog, rain, or mist, while in the May that followed we have had frosts and hard freezes. We will take the past five years, which will prove as much as the seventeen, and see what relation the frosts of May have to the fogs of January. In the year 1857, we had no days that could be called foggy, rainy, or misty, in the month of January, but in May we had cold weather. There were frosts on the mornings of the

8th, 10th, 12th, 13th, 16th, 17th, and 18th. Snow fell on the 10th and 17th, and ice one eighth of an inch in thickness was found in vessels containing but little water on the morning of the 10th, and one fourth of an inch on the mornings of the 11th, 17th, and 18th. We had also a heavy frost in June, killing almost every green thing. In the year 1858, on the 11th of January, we had fog, and on the mornings of the 3d, 11th, 13th, 16th, 22d, and 23d of May we had frosts, more or less. In 1859 we had fog on the 7th of January, and on the 23d of May we had a slight frost. In 1860 there was fog on the 7th and 11th of January, but in the month of May we had no frost, and it was the warmest month of May that we have had in the seventeen years I have recorded. In 1861 we had no fog, and not a day that could be called rainy or misty, in January; but in May we had frost on the 2d, 3d, 29th, and 30th."

1162. **Weather Prognostics.**—Every farmer should have some settled rules upon which he could safely calculate the prospects of the weather. It would be highly economical to a farmer if he would carefully study all the prognostics of the seasons, and such as indicate changes in the weather day by day. The use of the barometer is of doubtful utility to the farmer, but there are many homely barometrical signs that should not be neglected. The changes of the wind; the course of the clouds; the smoke beating to the ground; the circle around the moon; the flight of birds, both wild and domestic; the hurrying home of bees when a sudden shower approaches; the actions of domestic animals, swine in particular; the acute pains felt by rheumatic persons at the approach of storms; the absence or excess of moisture in the atmosphere, as indicated by the rapid evaporation of boiling water when the air is dry, or ready condensation upon the cold-water pitcher when it is moist; the peculiar sighing of the wind; the turning up of the leaves of the forest before a storm, and many more indications of change, should all be studied, better understood, and used to the farmer's benefit. Every chimney is as good an indicator of the changes of weather as any cheap barometer. If smoke is heavier than the atmosphere, it will, of course, fall to the ground as soon as it is disengaged from the heat which forces it through the chimney. When the fire is made in the morning, if the smoke is seen on the ground near the house, we may conclude foul weather will soon follow. The following sensible thoughts and words are from F. K. Phenix, of Bloomington, Ill.:

"How curious and humiliating that, after living in the world, as men have, for thousands of years, and learning about almost everything else, we should yet be in total darkness as to the character of the forthcoming seasons. Governed as they are by immutable laws, with historic records and scientific observations at command, what walking clods we are as to the impending weather! What immortality is there yet in store for some Storm-King, who shall unlock this mighty weather-vault, and hand over the key to his delighted fellows! If there be one well-ascertained fact in regard to the weather, why not make that a basis for other scientific calculations and deductions? For instance, it has been stated that there is every year about the same annual mean of temperature. Now, if this be the fact, how easy to foretell the general temperature of the last three or six months in each year from that of the preceding months! Will not the *savans* please figure up, and tell us what we may expect in future? It is also said that one extreme follows another. How natural, then, to infer that, after such a series of dry seasons as we had in Illinois in the five years preceding 1858, that we should that year get terrible rains; after which, drouths again, against both of which extremes farmers should provide, by thorough draining and deep culture. Here at the West, the weather doubtless has, in the matter of wet and dry, its cycles or periods—a very wet season occurring every six or seven years. Then might not this wet season have been anticipated? If navigators may know the tides of ocean, why may not we poor, water-logged landsmen know something of the great air-tides that give us fair or foul weather?"

Much, too, may be learned by careful observations of the thermometer. Look at this table of average in New York for ten years:

	1849.	1850.	1851.	1852	1853.	1854.	1855.	1856.	1857.	1858.
Aggregate averages	718	775	786	782	768	754	739	708	752	810
Average of fifteen days	48	$51\frac{2}{3}$	$52\frac{1}{3}$	52	51	$50\frac{1}{3}$	$49\frac{1}{3}$	47	50	54

This shows an average of temperature for the last period $3\frac{1}{2}°$ above the average. A careful observer would at once conclude, "This will be a good year for fruit;" and so it proved.

1163. **Gestation, Periods of, and Proper Time of Reproduction.**—The following table is compiled from good authority, and may be useful to young farmers. No exact period can be stated, however; for M. Tessier, of Paris, kept a record of 582 mares that copulated but once, and found the period of foaling varied from 287 to 419 days, making a difference of 132 days, and in the lowest number falling short of the usual time of eleven months by 47 days, and in the longest, overrunning the allotted time by 85 days; so you need not despair of your mare, cow, or other animal, if it does not bring forth at exactly the time fixed upon.

TABLE OF PERIODS FOR SEVERAL ANIMALS.

Kinds of Animals.	Proper age for Reproduction.	Period of the Power of Reproduction. Years.	Number of Females to one Male.	The most favorable season for Copulation.	Period of Gestation. Shortest. Days.	Mean. Days.	Longest. Days.
Mare	4 years.	10 to 12	—	May.	287	347	419
Stallion	5 "	12 to 15	20 to 30	—	—	—	—
Cow	3 "	10	—	July.	240	283	321
Bull	3 "	5	30 to 40	—	—	—	—
Ewe	2 "	6	—	Nov.	146	154	161
Tup	2 "	7	40 to 50	—	—	—	—
Sow	1 "	6	—	March.	109	115	143
Boar	1 "	6	6 to 10	—	—	—	—
She-Goat	2 "	6	—	Nov.	150	156	163
He-Goat	2 "	5	20 to 40	—	—	—	—
She-Ass	4 "	10 to 12	—	May.	365	380	391
He-Ass	5 "	12 to 15	—	—	—	—	—
She-Buffalo		—	—	—	281	308	335
Bitch	2 "	8 to 9	—	Feb.	55	60	63
Dog	2 "	8 to 9	—	—	—	—	—
She-Cat	1 "	5 to 6	—	—	48	50	56
He-Cat	1 "	9 to 10	5 to 6	—	—	—	—
Doe-Rabbit	6 months	5 to 6	—	Nov.	20	28	35
Buck-Rabbit	6 "	5 to 6	30	—	—	—	—

1164. **The Cultivation of White Beans as a Field Crop.**—It is often said of a man, "He don't know beans." If it was said he don't know how to grow them, the assertion would be often true. We do not know that we do, but we do know how to cure them. Here it is.

1165. **How to Cure White Beans.**—There is no crop that gives more trouble to the farmer in curing than beans, which from being late planted because grown among corn and from the shade, are often as green as ever at the time they must be harvested. With a good deal of trouble in hanging the vines on the corn, they will cure if the weather is propitious. Then they must be handled again and the whole carried by hand out one side of the field. Sometimes they are carried out in the first place and spread on fences, head lands, or green sward, to get them out of the way of cutting up the corn. This is hard work, and often proves labor lost, for if the season proves wet, the green vines will not cure, and the dry buds are often molded and beans blackened by the attempt to dry the vines. Now, if planted alone, there need be but one handling after pulling, and that will be to put them on the wagon, cured in the most perfect manner. We affirm that there is no crop grown that can be cured easier than white beans, no matter how green the vines when pulled. To do this, take some stakes about five feet long—old garden bean-poles will do—and go through the field and set as close together as your present experience will tell you is necessary. Place any old trash, such as coarse weeds, sticks, sods, or stones around the bottom of the poles to form a raised bed as you would for a hay-stack bottom, and then pull your beans and stack them in a single course around the stake, the roots inward, and dryest vines at the bottom and a tangled bunch at the top to hold the stack to its pole, and your beans will cure and look clean and bright, and the leaves and pods will be eaten with great avidity by the sheep. There is no other inexpensive way to cure field beans.

1166. **Suitable Soil for White Beans.**—There is no crop that will produce so well as white beans upon a thin gravelly knoll. We have seen twenty bushels of beans per acre upon land that would not produce twenty bushels of corn, if stalks and all were measured. They do not produce well upon rich soil, running too much to vines.

1167. **Growing Beans among Corn.**—We are opposed to planting beans with corn, except solely to fill up vacant spots, because we do not think there is anything gained by planting the two crops together. The practice originated in early times, when cleared land was scarce, and when the soil was rich, and when it was an object to get as much food off one acre as possible, because the owner had no other ground that he could use; and so the practice has come down to the present day, each generation following it because "father did so," without even inquiring why. In our opinion the most advantageous course to pursue for a profitable bean crop, is to plant the seed upon land that it would not be profitable to use for Indian corn, making the rows in drills about twenty inches apart, and manuring them with fine compost to give them an early start and vigor while young, rather than a large growth of vines, which they get among corn. Beans must never be worked while wet with rain or dew, and that is a good reason for keeping them away from corn, for that may be worked to good advantage when dripping wet. The only advantage, besides the two crops upon one surface, that we ever heard contended for by planters of beans among corn, is the convenience of curing the vines upon the cornstalks.

1168. **Hop Culture.**—The hop is a hardy perennial, of easy cultivation, and will grow in any part of the Union. It requires a deep, rich, mellow soil, with a dry, porous, or rocky sub-soil. The exposure in a northern climate should be toward the south, as on the slope of a hill, or in any well-sheltered valley. It may be propagated by seeds or by divisions of the roots; but it is more usual to plant the young shoots which rise from the bottoms of the stems of old plants. These are laid down in the earth till they strike, when they are cut off and planted in a nursery-bed. Care must be taken to have only one sort of hops in one plot, that they may all ripen at the same time. The ground having been prepared for planting, it is divided by parallel lines six feet apart, and short sticks are inserted into the ground, along the lines, seven feet distant from each other, and so as to alternate in the rows, as is frequently done with fruit-trees and other plants, in what is called the quincunx form. By this method, every plant will be seven feet from each of its neighbors, although the rows will be only six feet apart, and thus one eighth of ground will be saved. Fresh dung should never be applied to hops. A watering with liquid manure will greatly assist their taking root. During their growth the ground should be well hoed, and some of the fine mold thrown up around the roots. Any good corn ground will produce hops. The roots are usually planted in corn land and grow with the corn the first year. They produce the second year $300 to $400 per acre at 35 cents per pound. Liberal applications of manure are needed, and they do not affect the quality of product, as is the case with tobacco. Besides farm-yard dung, wool, hair, bones, plaster, lime, and ashes are all useful fertilizers. In England, the Kent and Sussex hop-growers calculate upon spending about $50 per acre for special manures, in addition to what of the ordinary kind they make on the farm. With such care, they have hop plantations 300 years old. The ground must be trenched and worked deeply. About 1,200 hills is the proper number per acre, and for each 200 hills there should be one hill of malé plants. When picked, the hops should be at once dried, and this is better done by passing a current of hot air over them than in placing them in a room where they get only the radiated heat from a stove.

1169. **What Constitutes the Value of Hops.**—The yellow powder of the flowers contains all the value of hops. It is not in the leaves; they are good for nothing. If the powder, *lupulin*, was separated from hops and put up in soldered cans, there would be no need of transporting the bulky material of hop bales. Liebig recommends exposing hops to the fumes of sulphur, as thus the *lupulin*, or active principle, may be preserved from one season to another. The practice is opposed by some, but adopted by many of the best Munich brewers. The hop crop varies from year to year to such an extent that the price is very fluctuating, and even in a single season or a month may make a difference of 100 per cent.

1170. **Growing Hops without Poles.**—The great expense in preparing a hop-yard is a good set of poles. To avoid this, posts have been set and wires drawn across the yard, and vines trained up on strings fastened to a stake at the hill, and to the wire at top. In France, a hop-grower has discovered that he can train his hop vines horizontal to a low trellis. The French Academy recommend this plan because it enables the grower to investigate the plant while growing, and cleanse it from the numerous insects which injure it to so vast an extent; then it is protected from the sun, which always destroys the upper shoots; it obviates the great destruction of hops in stormy weather, when the wind lays low whole hop-grounds from the hight of the poles; and most of all, it enables the gathering of the cones to take place without uprooting the plant, besides permitting the selection of the ripest ones at first, and preventing the great loss which arises from the necessity of tearing down the whole plant to get at the ripest blossoms.

1171. **Teasels as a Crop.**—It is worth while for farmers to consider whether teasels as a crop are not worthy of more attention. We have seen it stated that a fair average crop is 200,000 burs per acre, and we think a fair average price is $1 50 a thousand. Their cultivation is not a new thing in this country, though but little attended to. Nor is it difficult. A Mr. Wells (N. L., we think), of East Windsor, Conn., has grown them many years, and found them profitable. The most suitable soil is a rich clayey loam, of rather a moist nature, such as would produce two tuns of hay per acre. The best preparation is to grow potatoes upon the turned sod without manure; the next spring manure heavily, plow eight inches deep, pulverize the soil thoroughly with a cultivator, and then level smooth with a bush-drag. The seed, after soaking one night, is rolled in plaster, and dropped by hand in shallow drill marks, thirty inches apart. It should be sowed very thick, sometimes half a bushel per acre, as it vegetates badly. Like cotton or broom-corn, if too thick it is "thinned to a stand." The time of planting is when the ground is in good order, about the first of June. Do not cover the seed more than half an inch deep with fine earth, but press it hard with "a spatter," made of a plank, with a convenient handle. In about two weeks the rows can be seen, when a hand or horse hoe must be put to work. At the second hoeing the plants may be thinned out, leaving them four or five inches apart. The after-culture is to keep the ground absolutely clean till about the middle of November, when the plants are covered with straw, held in place by dirt, to remain till first of May, or till freezing nights are past, when the plants are uncovered and weeds kept down till the plants grow, as they soon do, to cover the ground closely. Soon after the flowers drop, the burs must be cut with stems about four inches long, and carried to the drying-house, where they are spread upon open-work shelves of slats, poles, or small rails in tiers one above another, so as to give a free circulation of air. They may be placed a foot thick upon shelves of this sort. A good hand can cut 15,000 or 20,000 a day, but the harvest should commence by the time half the flowers in a field are off. The top burs drop their flowers first; these are called "King," but are not quite as good as the burs next below, which are called "Queens." A stalk has from four to six No. 1 teasels, and twenty to thirty, and sometimes fifty which are merchantable. The most common method of disposing of the teasel stalks is by mowing, drying, and burning on the ground. Two crops in succession generally do well, but more than that is not recommended.

1172. **Prices in Connecticut a Hundred Years ago.**—From a curious and interesting document fully published in the *The Homestead*, at Hartford, Conn., we have extracted the prices of farm produce and *slaves*, as sworn to in the inventory of the estate of Captain Thomas Wheeler, of Stonington, Dec. 11, 1755—a little over one hundred years ago. Captain Wheeler was one of the largest landed proprietors in that town, and the appraisement of his estate amounts to £12,669 9s. 5d., Connecticut currency, which, at six shillings to the dollar and twenty shillings to the pound, gives $42,231 55, which in those days constituted him a pretty rich man. The home farm is appraised at £7,000, and the prices of the following articles are given in pounds, shillings, and pence, which we have reduced to dollars and cents—which, by way of comparison with present prices, will be interesting; as well as the fact that only a hundred years ago Cæsar, Scipio, and Hagar were part and parcel of a dead man's estate; and also the prices at which these "chattels" were valued at that time in Connecticut. Perhaps, however, the inventory of a South Carolina planter dying in 1855 will be read with just as much curiosity and wonder, as regards both the price and existence of slaves, a hundred years hence, as this is of a time a hundred years past. The quotations from Col. Wheeler's inventory are as follows:

Three hundred and ninety-eight bushels of Indian corn, £40 5s. 2d.—33¾c. per bushel.

Eight bushels wheat, 30s.—62½c. per bushel: fifteen bushels rye, 37s. 6d. —41⅔c. per bushel.

Five bushels beans, 16s. 8d.—55½c. per bushel; fifty bushels salt, £6 5s. —41⅔c. per bushel.

One and a half bushels malt, 4s. 4d.—47c. per bushel; twenty-seven pounds tallow, 9s.—5½c. per pound.

Twenty-five hundred seventy-four pounds cheese, 3d. per pound—4⅙c. per pound.

One hundred eighty-seven pounds flax, in ye swingle, 6d. per pound—8⅓c. per pound.

One hundred twenty-five tuns hay, 25s. a tun—$4 17 per tun.

Half bushel flax seed, 1s. 3d.—42c. per bushel.

Three hundred fifty feet pine boards, 17s. 3d.—$2 87½; eighty squares glass, 16s. 8d.—3⅜c. per square.

His riding horse, saddle, and bridle, £16 13s. 4d.—$55 55.

One old sorrel horse, £7 18s. 4d.—$26 38.

One black horse, £16 13s. 4d.—$55 55.

One sorrel horse, swift nose, £11 5s.—$37 50.
One sorrel horse, bald face, £12 5s.—$40 85.
One pied horse, £10—$33 34.
One small horse, swift nose, £6 13s. 4d.—$22 21.
One sorrel stone horse, two years old, £9 11s. 3d.—$31 96.
One sorrel year-old horse, $4 11s. 8d.; one do., £4 11s. 8d.—$15 28—$15 28.
One old sorrel mare and mare colt, £2 18s. 4d.—$9 71.
One old bay mare and horse colt, £3 6s. 8d.—$11 11.
One old black mare and horse colt, £8 6s. 9d.—$27 80.
One black mare and white face mare colt, £8 6s. 8d.—$27 78.
One large sorrel mare, white face horse colt, £14 3s. 4d.—$47 22.
One old bay mare, £2 18s. 4d.; one sorrel two-year-old mare colt—old bay, $9 71; colt, $12 21.
One sorrel mare, swift nose, £10 8s. 4d.—$34 71.
One black mare, swift nose, £10 16s. 8d.—$36 11.
One brown mare, £5 16s. 8d.—$19 42.
One fat ox, £5 8s. 4d.; two speckled lean do.. £11 13s. 4d.—one fat ox, $18 06—one pair, $38 90.
Two brown pied oxen, £10 8s. 4d.—$34 72.
Two brown pied oxen, £10 16s. 8d.; two red pied do., £13—$36 11, $43 34.
Two white pied oxen, £8 15s.—$29 17.
One brown fat cow, £4 3s. 4d; one speckled cow, £3 3s. 4d.—$16 90, $10 55.
Twenty-three fat cattle, at £2 18s. 4d. per head—$9 72.
One bull, £2 18s. 4d.; thirty-two cows, £86 8s. 4d.—$223 61.
Twenty-five two-year-old cattle, £41 13s. 4d.—per head, $5 51—$138 90.
Twenty-six one-year-old cattle, £30 6s. 8d.—per head, $3 89—$101 11.
Twenty-five calves, £15 12s. 6d.—$2 08 per head; total, $52.
One hundred and seventy-nine store sheep, £26 2s. 1d.—48c. per head—$87.
Five sheep rams, £1 5s.—83c. per head.—$4 17.
Fifty-six fat swine, £65—$3 86 per head—$216 67.
Sixty-five store swine, £14 15s.—75c. per head—$49 17.
One negro man named Quash, £2 10s.—$8 34.
One old negro woman named Juno, 16s. 8d.—$2 76.
One negro man named Cab, £41 14s. 4d.—$139 06.
One negro man named Cæsar, £38 10s.—$128 34.
One negro man named Cipeo, £45 16s. 8d.—$152 78.
One negro woman named Hagar, £37 10s.—$125.
One negro woman named Flora, £31 13s.—$105 50.
One negro woman named Sarah, £40—$133 34.
One negro woman named Jane, £37 10s.—$125.
One negro woman named Cloe, £37 10s.—$125.
One negro boy named Pharaoh, £8 8s.—$28.
One negro girl named Phillis, £15—$50.
One servant mulatto boy Harry, £8 6s. 8d.—$27 78.
One servant mulatto girl Elizabeth, £5—$16 67.
One servant Indian woman Mary, £1 13s. 4d.—$5 55.

Corn is appraised at 33¾c.; rye, at 41⅔c. a bushel. The price of horses, beeves, store cattle, sheep, and swine will strike every one acquainted with present prices of such stock as quite remarkable, but not more so than the variation between the price of slaves in Connecticut in 1755 and the price of slaves in Virginia in 1855. Old Juno is valued at $2 76, which seems to be the minimum value of one of the human family, while the maximum is only $152 78—a valuation that lacks a cipher at the right hand to make it equal to the current rates usual south of that noted line of Mason and Dixon. The "mulatto girl Elizabeth" must have been very young or very ugly, or the appraisers were actuated by different motives from those which influence the "friends of the peculiar institution" at the South, or she would have been valued at a much higher figure than £5—$16 67—even in those days of cheap chattels. One servant Indian woman "Mary," rated at $5 55, shows not only that the aborigines were enslaved, but that they were estimated at a low price. As an evidence of the little care for literature which prevailed a century ago, we notice that all the books of this rich man's estate were valued at only 56 shillings—$9 33. That is not so singular, for even in our day slaves and libraries are not always found in abundance upon the same inventory.

1173. **Winter Employment of Farm Laborers.**—As a rule, our farmers are not employing a fourth part of the labor they might make profitable. Labor well bestowed would double the grass crop of any State in less than five years.

It is one of the greatest difficulties in the way of American farming, this six months on and six months off of laborers. There is a constant complaint about the trouble of getting good farm laborers, and this trouble is constantly augmenting—growing worse and worse at every annual return of the hiring season. And why? Because our laborers are mainly made up of foreigners unaccustomed to our modes of farming, unused to the climate, and unfitted for farm labor without previous training; and all that one of them gains in this line in one season is generally lost to the one who gave it, because he only employs his farm hands for the summer, instead of the whole year. We have never conversed with a farmer who did not deplore this state of things, and acknowledge that it would be much better, that is, more profitable to keep the same laborers on from year to year after they had learned "the ways of the farm."

"Then why not do it?"

"Oh, dear, bless your soul, I would if I could, but I have nothing, or next to nothing, to do in the winter."

Now is this so? Have farmers nothing to do? Look about your farm and see. Have you no ditches to dig, no swamps to drain, no muck to dig for manure—no stone, timber, fuel, or manure to haul—no holes, large, deep, and wide to dig for setting fruit-trees in the spring—no land on your farm that needs and will pay for underdraining? For all of this work can be done during the many good out-door working days of winter, and, as a general thing, will not be done at any other season.

A good farmer can always provide work for stormy weather under shelter. There is fuel to be cut and split in the wood-house. There are gates, and bars, and fence-posts to be made in the workshop. There is manure to be piled in the yard—that should be done every day—and there should be manure to be forked over in the barn cellar. There are straw and stalks to be cut, and this may be done in quantity if the cut stuff is packed in boxes or barrels, so as not to dry up before it is wanted to feed out. There is corn to shell in the granary, and this is good work for dry, cold days, when it would be pretty severe to work out of doors.

We have long advocated thrashing to be done more with flails and less with machines, because it costs no more to thrash with flails, and the straw is better for stock, and it gives employment to farm laborers in winter, which is more important than all other considerations; for if they are not employed, it frequently happens that actual suffering ensues, and at the same time their former employer will lose their services another year, and in the end will actually pay as much or more for what he gets out of a raw hand each summer than he would have paid, the winter included, for one good hand.

If, as all well know, it is bad policy to part with a good hand, it is bad policy not to furnish employment for the winter. It is not only bad policy, but it is a wrong to the class who make up the farm laborers. Think of this in the first winter storm, when you think of your brute creatures, what may be the suffering condition of your laborers that you have discharged because you thought you had nothing to do. In this you are mistaken. You can find employment, and can make it profitable. But if not, you can not conscientiously discharge your poor dependent laborers, many of them strangers not only within your gates, but upon our side of the great Atlantic. Tell them, at least, that the roof which has sheltered them in summer shall not be denied them in winter. If you really can not find full employment for them, tell them fairly what you can do—that you will feed them in all weather and employ them in all days when they can work to advantage.

More than one half of the new emigrants that have found work upon farms during the summer within reach of this city will come directly here to spend their earnings while looking for city employment, and they will go back to their farm-work in the spring as ill fitted for it as half-starved oxen are to drag the plow, and cart the manure, and draw the fencing, and much other work that they could have done to better advantage in warm days in winter.

Let every farmer who is about to discharge a farm laborer, put his hand upon his heart to mark its pulsations, while he asks it this question: "Am I doing as I would that others should do to me?" The assertion that you have nothing or can have nothing to do is an erroneous one. There are but few, if any, farms that require three summer laborers that could not find profitable employment for at least two of them all the winter. It is extremely bad economy to discharge hands that have worked faithfully, and have just got used to the ways of the farm, and would be valuable help another year, and leave them to shift for themselves, more uncared for than your cattle, because you have nothing to do in winter. If you do so you must expect to meet with the same trouble in hiring help every coming spring that you have in every past one. There is a great influx to the cities every winter of persons willing to work, but who have been discharged where there was work to do, and have gone there as the most likely place to find shelter for the winter, but there they can find nothing to do; the city labor market is overstocked.

Farmers, we appeal to you for your own interest; we appeal to you upon the "golden rule;" we appeal to you for the sake of all who are willing to work for their bread; we appeal to you for those who, ignorant but not vicious, need your guardianship, that you do not send or leave one unemployed to come back to this city, where he will not only be idle, but assuredly acquire vicious habits that will make him a less valuable servant next year than this.

This common practice of discharging laborers in autumn is one that will in a short period quite destroy the efficiency of farm laborers. Their disposition to come to the city to spend the winter, farmers should check, not encourage. A man who has spent the winter in idleness in the city is not worth half as much in summer as one that remains continuously on the farm; and the same thing is true of in-door servants.

"What can I do in winter?" is the usual reply in argument against keeping laborers through the year. One thing that a farmer can do late in autumn, and often in many winter days, is to prepare for setting out a few more fruit-trees in the spring. We contend that not one farmer in a hundred has a sufficient supply of trees yielding fruit in their season. An orchard that gives good, marketable apples is always profitable to its owner if within reach of any large towns, for these apples are always salable and always at paying prices, if of good eating or cooking sorts, of summer or winter fruit, if carefully hand-picked and packed in neat barrels. Land for an orchard of any kind of fruit-trees will amply pay for draining with tiles or good stone underdrains; these must be set deep—not less than five feet. The land must be plowed deep and subsoiled, if its character will admit of it; and if not, the holes for the trees should be dug out three feet deep and eight feet across. Leave these open all winter; in the spring put back the sods and surface earth at the bottom, and haul some rich earth, compost, chip manure, or leaf mold, to set the roots in. Getting this ready, is work for the last earth-working days in autumn. Time will produce $10 for every day thus occupied, when your trees yield their fruit. Every iota of fuel to be used in summer should be prepared ready for the fireplace, whether on hearth, or stove, or oven, during winter. Many a farmer could economically employ a man all winter to thrash grain with a flail and cut the straw for stock. Much work at ditching, fencing, stone-digging, rock-blasting, manure hauling, and in some winters plowing, can be done to good advantage in the latitude of New York city. And if nothing can be done, it is better for both employer and hireling that farm hands should be idle on the farm than in the city. If farmers have a surplus of leisure in winter, we advise them to organize farmers' clubs, and meet every week, and have all the farm laborers attend. Something will be learned.

1174. **Rules for a Farmers' Club.**—E. C. Packhurst, of York, Penn., says: "A good many farmers would organize farmers' clubs, if they knew how. Will you give us a copy of the Constitution and Rules of your New York Farmers' Club, if you have them printed?"

There is a set of printed rules, but they are never referred to nor ever needed for any club. The members should agree to meet once a week or once a month, at a given hour and place. Select a chairman, to preserve order in debate, and open the meeting with any miscellaneous matter that any one chooses to bring up, and allow one hour for such discussion. Then devote another hour to some question agreed upon at the previous meeting, and adjourn punctually at the time. Make the whole discussion to consist of brief facts, but never dispute. Get some one to prepare a paper to be read at each meeting, if possible. We advise every farming neighborhood that can muster ten intelligent men, who will attend a farmers' club, at once to form one. But do not make any formal constitution and by-laws, or conventional rules, but make your meetings social and conversational. Let your organization be of the simplest form possible, and avoid all formality in your meeting, except just enough to preserve order. Let one man act as secretary, to keep a few simple minutes, and advertise meetings; and let them be open to everybody, without fee or membership; and if money is needed, ask anybody and everybody to contribute. If they won't do it, but leave all the burden of the expense and business of the club to rest on the shoulders of three or four persons, give it up. The time has not come for a farmers' club in that neighborhood. It is a good plan, in the country, to meet at each other's houses; but, to succeed, you must get your wives and daughters interested. A farmers' club is a barren wilderness, unless smiled upon by woman. One excellent subject for discussion would be about improved farm stock. Another, farm implements. More than one half of the benefit which might be derived from the various labor-saving improvements in agriculture, which have flooded our country for the last ten years, is lost by our general ignorance of their construction and the proper method of working them. How to use manure, and how to make land more productive, and consequently more profitable, are questions that can not be discussed too much.

1175. **Farm Accounts and Farm Economy.**—No man can be a good farmer and a successful one who does not keep accurate accounts. Be able to tell, at the end of the year, every dollar that came to hand, and what for, and every one that goes out, and why it went; and balance your cash account at least once a month—once a week is better. Keep accounts with everybody, debit and credit, and in some degree, with everything. Number your fields, and charge each with manure, seed, and labor, and credit the crops, and you will soon find which is the most profitable. Open an account with your stable, your pig-pen, your pasture, and with your general stock, and with different classes and branches of it, if you would learn with accuracy which is the most profitable. To be successful, you must be accurate; to be accurate, you must keep account-books.

True economy does not consist in mere saving and stinting; it requires far-reaching views and a generous spirit to decide practical questions upon that just basis which secures the greatest measure of success. We must look further than the first cost. In farm stock, for instance, when once obtained, it costs little more to raise, to any given age, a good animal than a bad one, while one may be far more remunerative than the other.

And finally, as the very concentrated essence of farm economy, every American farmer, who is worthy of the name, will obtain this volume, and study it from title-page to

FINIS.

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INDEX OF NAMES OF PERSONS

Referred to as authority, or quoted from, in the compilation of this work, independent of editors of agricultural journals. Most of those mentioned are practical farmers, now living; and, so far as possible, the residence of each is given, to enable others to consult them if desired. The list shows that the work is made up of opinions and practices of the present rather than of the past, and that its character is American.

CREDIT.

"*Give honor to whom honor is due.*" I have not given credit in the body of the work to all the sources from which I have gathered facts. I freely acknowledge myself indebted to the whole agricultural press. I give a list of these papers as they were when I commenced compiling the work in 1861, though we are aware that quite a number of them, particularly in Southern States, have been discontinued.

AGRICULTURAL PAPERS IN THE UNITED STATES.

The Maine Farmer. This is a large-sized folio, clearly printed on good white paper; one page is devoted to well-selected agricultural matter. Homan & Manley, Augusta, Me., proprietors. Dr. E. Holmes, editor; weekly, $2 a year.

Eastern Farmer, published at Ellsworth, Me., a weekly folio, at $1 a year, by Wasson & Moore, is about one third agricultural.

The New Hampshire Journal of Agriculture, folio, is published at Manchester, N. H., by Wm. H. Gilmore, at $1 50 a year; Z. Breed & M. A. Cortland, editors. It is about half agricultural.

Boston makes a good show of agricultural papers in the four next following:

The New England Farmer is the continuation of one of the oldest of farmers' papers. Many will remember *The New England Farmer* and Fessenden, of auld lang syne. It is now published weekly by Nourse, Eaton & Talman, with Gov. Simon Brown as editor, and is really one of the best on the list. It is a large, handsomely-printed folio, published at $2 a year, and always has one page or more of valuable matter for the farmer. There is or was a monthly, at $1 a year, made up of the agricultural matter of the weekly.

The Massachusetts Ploughman is another of similar character, not quite so much devoted to farming as *The N. E. Farmer*, but is a good family paper. Weekly, $2 a year. W. &. W. J. Buckminster, editors and proprietors.

Boston Cultivator; a large quarto, now in its twenty-second volume, published weekly, at $2 a year, by O. Brewer & Son; is about one fourth agricultural. James Pedder, formerly editor of *The Farmer's Cabinet*, Philadelphia, was, many years before his death, connected with *The Cultivator*, and so was—perhaps is—Sanford Howard.

Magazine of Horticulture; a monthly octavo of 48 pages, published by Hovey & Co. at $2; is now in its twenty-sixth volume. It is devoted entirely to horticultural matters, fruits, flowers, etc., and is the journal of the Massachusetts Horticultural Society, and is patronized by all the leading horticulturists in the country. It is not so well adapted to the wants of farmers' families generally, as it is to suburban residents who have an abundance of money to spend in beautifying their places. It is always faultless in its typography.

The Homestead, a weekly octavo of 32 pages, formerly a quarto of 16 pages, is published at Hartford, Conn., by Mason C. Weld, at $2 a year, and now in its sixth volume. It is devoted to agriculture, and particularly to Connecticut farming; often showing up the bad as well as the good. It is a good paper for farmers. Rev. Wm. Clift, Henry A. Dyer, Secretary of Connecticut State Agricultural Society, and T. S. Gold, are its editors.

The American Agriculturist, a large, beautifully printed monthly quarto of 32 pages, filled with matter designed to advance the science of agriculture and horticulture, and improvement of all that pertains to rural life. Orange Judd, editor and proprietor; $1 a year; New

York city. This paper is now in its nineteenth year, and probably has the largest circulation of any agricultural paper in America, and is published in an office with a rent of $3,000 a year. This indicates success in a purely agricultural journal.

The Americanischer Agriculturist is a German translation of the above, of the same form, size, and price, and is, we believe, the first German agricultural paper published in this country.

The Horticulturist; originally established by Luther Tucker at Albany, and edited by A. J. Downing; is now published in New York by C. M. Saxton, Barker & Co., and edited by Peter B. Mead. It is a large octavo, 48 pages, monthly, $2 a year (with colored plates $5). It is mainly devoted to the higher branches of horticulture, where the outlay is necessarily large, rather than to the wants of the many, and its circulation is therefore limited to a class not yet very large in this country. It is generally to be found in all first-class rural residences, and in those of "fancy farmers," as they are called, and of all gardeners and nurserymen of good standing.

The Working Farmer; a monthly quarto of 24 pages, beautifully printed, edited by Professor Mapes, and published in New York city by his son, C. V. Mapes, at $1 a year. It is now in its twelfth volume, and is always filled with valuable matter. It copies from the best foreign agricultural journals, and is richly deserving of a much larger circulation.

American Stock Journal; a monthly octavo of 32 pages; D. C. Linsley, editor and proprietor, New York, $1 a year; mainly devoted to matters connected with the business of raising farm-stock, though it contains much useful information upon agriculture in general.

The Country Gentleman; a weekly paper, whose title indicates its purpose; is published at Albany, by Luther Tucker & Son, and is one of the neatest specimens of typography exhibited in any weekly paper, and is always readable, the matter being nearly all agricultural. It is edited by the proprietors and J. J. Thomas, a veteran editor, and its readers get from it a mass of valuable information for $2 a year in its 16 handsome quarto pages.

The Cultivator is a monthly, made up from the above, 24 handsome, large octavo pages, at 50 cents a year. It is now in its twenty-second volume.

The Rural American is a weekly quarto, with just agriculture enough to call it an agricultural journal, published at Clinton, N. Y., at $1 50 a year; T. B. Miner, editor and proprietor. It has been published some five years, having started, we believe, at 25 cents a year.

The Saratoga Farmer. This is a new enterprise, by G. A. Corey, Saratoga Springs; 16 pages octavo, monthly, at $1 a year.

The Dairy Farmer, Little Falls, N. Y., monthly, 32 pages octavo; A. W. Eaton, publisher, at 50 cents a year. This is also a new work, devoted chiefly to dairy farming.

The Genesee Farmer. This is a continuation of the oldest farming paper in the State. It is a well-printed octavo, 32 pages, of valuable matter for all farmers, published at 50 cents a year monthly, at Rochester, N. Y., by Joseph Harris, editor and proprietor.

Moore's Rural New Yorker, Rochester; large quarto, weekly, $2 a year. It is divided equally between agricultural affairs and miscellaneous matters. It is deservedly a very popular family paper. D. D. T. Moore, proprietor and editor, assisted by "an able corps of assistants."

This makes up a round dozen of agricultural papers in the State of New York. Besides these, several of the political papers, of late years, have devoted much space to giving practical information to farmers. Of this class, the *Tribune* is one, and is welcomed into many a family on account of such information.

The New Jersey Farmer; now in its fifth volume; is published in Trenton, by D. Naar, editor and proprietor, at $1 a year; 32 pages octavo; agriculture and horticulture.

The Gardener's Monthly; octavo, 48 pages; a popular journal, chiefly devoted to horticulture; is now in its second volume. We hope for it a long life of usefulness. Edited by Thomas Meehan, Philadelphia; $1 a year.

Farmer and Gardener, Philadelphia; octavo, 32 pages, agricultural and horticultural; $1 a year. A. M. Spangler, editor and proprietor; is in its second volume.

The Germantown (Penn.) *Telegraph* is an old established miscellaneous paper with an agricultural department; a weekly quarto, $2 a year. P. R. Freas, editor and proprietor.

National Agriculturist, Pittsburg, Penn., in its third volume, is an 8 page quarto, published monthly, at $1 a year, by J. T. F. Wright, editor and proprietor; devoted principally to agriculture, but in part to general miscellany.

Ohio Farmer, Cleveland; weekly, $2 a year; a handsome quarto, filled with miscellaneous and agricultural matter suited to an enlightened farmer's family. Col. S. D. Harris, editor and proprietor.

The House and Garden is published monthly, at Cleveland, at 50 cents a year, by Thomas Brown, editor and proprietor. It is a 16 page pamphlet, devoted to agricultural and household affairs.

The Wool-Grower is a monthly quarto, devoted to the interests of wool-growers, stock matters, and miscellany. It purports to be printed at Cleveland, Ohio, at 50 cents a year, without editor or publisher being named.

Ohio Cultivator, Columbus; semi-monthly; in its sixteenth volume, at $1 a year, is a large octavo, 16 pages, devoted to agriculture, horticulture, and stock. Col. S. D. Harris, editor and proprietor.

Ohio Valley Farmer, Cincinnati; a monthly quarto, 16 pages, now volume five, $1 a year; agricultural and horticultural. Published by B. F. Sanford.

The Cincinnatus, Cincinnati, Ohio; a monthly octavo, 48 pages; a neatly got-up pamphlet, published in covers at $2 a year, edited by F. G. Cary, proprietor, is now in its fifth volume. It is agricultural and horticultural, and prints the proceedings of the Cincinnati Horticultural Society.

The Farmer's Home is the name of another Cincinnati agricultural paper, published monthly, by E. M. Spencer & Co., at 50 cents a year.

Indiana Farmer, J. N. Ray, editor and proprietor, Indianapolis; semi-monthly, 16 pages quarto, $1 a year, is now in its ninth volume; and though called the *Indiana Farmer*, is filled with matter equally well adapted to farming in the adjoining States.

Michigan Farmer, Detroit; an old established weekly quarto, 8 pages, $2 a year; R. F. Johnson, editor and publisher; is mainly devoted to agriculture and kindred subjects.

Wisconsin Farmer, Madison; D. J. Powers & Co., publishers; 32 pages octavo, $1 a year; agricultural and horticultural; adapted to the wants of the Northwest.

Prairie Farmer, Chicago, Illinois; Emery & Co., publishers; a well-printed quarto of 16 pages, weekly, at $2 a year; making agriculture its leading feature, with horticulture and family miscellany. This paper dates back over twenty years. It was established by John S. Wright, and has always been conducted with such ability as to make it particularly valuable to all Western farmers.

Farmers' Advocate, Chicago; J. Bonham, editor and proprietor; a weekly quarto, 16 pages, $1 50 a year; an offshoot of the *Prairie Farmer* of some three years' standing.

Illinois Farmer, Springfield; Bailhache & Baker, publishers; monthly quarto, 16 pages, $1 a year, in its fifth volume; is mainly agricultural, and especially devoted to the interests of the Illinois farmer.

Iowa Farmer. There was—perhaps is—an *Iowa Farmer*, edited by Wm. Duane Wilson.

Nebraska Farmer, Brownsville; volume one, monthly octavo, 16 pages, agricultural and horticultural, $1 a year; R. N. Farnas, publisher.

Valley Farmer. Norman J. Coleman, editor and publisher, St. Louis; A. Gunter, publisher, Louisville; H. P. Byram, traveling editor; octavo, 32 pages, $1 a year; a monthly agricultural journal, designed to benefit the planter, farmer, gardener, fruit-grower, and stock-raiser. It is a covered pamphlet, handsomely printed, and in matter well worthy of the patronage of those it is intended to benefit.

Oregon Farmer, Portland; A. G. Walling, editor; semi-monthly quarto, 8 pages, $2 50 a year; now in its third volume of agricultural, horticultural, and miscellaneous matter suited to that State.

The Minnesota Farmer and Gardener; published at St. Paul, monthly, in octavo form, 32 pages, L. M. Ford & Co., publishers. Vol. I. looks well. Price, $1 per annum.

California Farmer, San Francisco; 8 well-printed pages quarto, weekly, at $5 a year. An agricultural and miscellaneous journal, largely patronized by advertisers. Edited and published by Col. Warren. It is now in its fourteenth volume, and is doubtless found valuable to the agricultural community in the gold-digging State.

California Culturist, San Francisco; Wadsworth & Flint, editors and proprietors; a monthly octavo of 48 pages, at $4 a year; devoted to agriculture and horticulture; in its third volume.

The American Farmer; first published over forty years ago at Baltimore; is a monthly octavo of 32 pages, at $1 a year; by Worthington & Lewis, successors to Samuel Sands, who succeeded John S. Skinner. This has always been a well-conducted, popular paper, the contents never belying its name, though somewhat more devoted to Southern than Northern farming.

The Rural Register, Baltimore, Md.; quarto, 16 pages, in three columns, exclusive of advertisements; by Samuel Sands, who was publisher of *The American Farmer* for a long time, and S. Sands Mills. This paper is now in its second volume, and well filled with matter as well suited to Northern farmers as Southern planters. Monthly, $1 a year.

Southern Planter; a small sized octavo, 64 pages; published monthly at Richmond, Va., by Augustus Williams, at $2 a year; maintains a popularity established twenty years ago.

North Carolina Planter; published monthly, at Raleigh, by A. W. Gorman, at $2 a year; octavo, 32 pages. This, as its name indicates, is local in its character, and as such entitled to patronage. It is now in its third volume.

The Edgecombe Farm Journal is published at Tarboro', N. C., in one of the most enterprising, improving sections of that State. It is now in its first volume; is a well-printed quarto, 8 pages, monthly; 50 cents a year; William B. Smith & Co., editors and proprietors, who certainly give their subscribers (we hope they are numerous) the value of their money.

Farmer and Planter, Columbia, S. C.; R. M. Stokes, proprietor, Col. Sumner, editor; octavo, 32 pages, covered; monthly, $1 a year. Particularly adapted to Southern agriculture, and valuable for all planters. It has been published eleven years, but has never received the patronage it merits.

The Southern Cultivator; a large octavo of 32 pages; is published monthly, by W. S. Jones, at Augusta, Georgia, at $1 a year; was formerly edited by Dr. Lee, and now by the publisher and Mr. Redmond. It is Southern in its character, and justly popular there.

Southern Field and Fireside; published weekly, at Augusta, by J. Gardner, at $2 a year; is partly agricultural and partly miscellaneous; a quarto, now in its second volume.

American Cotton Planter, Montgomery, Alabama; a monthly octavo of 48 pages. A Southern journal of agriculture, at $1 a year, by Dr. Cloud, editor and proprietor.

Southern Rural Gentleman, Grenada, Miss.; a quarto-weekly, $2 50 a year; J. L. Davis, proprietor; is now in its third volume, and is made up of agricultural and miscellaneous matter suited to that region.

Canadian Agriculturist, Toronto; appears to be published by the Board of Agriculture, and contains its transactions and other agricultural matter, principally Canadian. It is issued semi-monthly, 32 octavo pages, at 50 cents a year.

Possibly I have missed some, particularly those that print much agricultural matter, like the *Weekly* and *Semi-Weekly Tribune*, and I also add two new ones:

The Sorgo Journal, published monthly, by Wm. H. Clark, Cincinnati, Ohio. $1.

Land-Marks, a quarto monthly, at $1, by Dr. C. W. Grant, the great grape propagator and fruit culturist, Iona, near Peekskill, N. Y.